2009 Atlantic Mackerel, Squid and Butterfish Specifications
Environmental Assessment
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

September 18, 2008

Prepared by the

Mid-Atlantic Fishery Management Council

In cooperation with the

National Marine Fisheries Service

1.0 EXECUTIVE SUMMARY

The Mid-Atlantic Fishery Management Council made recommendations for 2009 specifications for the Atlantic mackerel, squid and butterfish (MSB) fisheries at its June 2008 meeting and herein submits them to the Regional Administrator, Northeast Region, National Marine Fisheries Service. This document examines the expected impacts to the environment from implementation of these recommended specifications. 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" has been made. The following paragraphs summarize the proposed preferred measures for each of the MSB fisheries, and the expected qualitative impacts from the range of alternatives considered are described in Table 1.

Atlantic mackerel

The preferred alternative proposes: Acceptable Biological Catch (ABC) = 156,000 metric tons (mt), Initial Optimum Yield (IOY)=Domestic Annual Harvest (DAH)= 115,000 mt, Domestic Annual Processing (DAP) = 100,000 mt, the same as in 2008. Like last year, the Council proposes that when 90% of the OY is projected to be landed, the directed fishery closes. However, if 90% of Optimum Yield (OY) is reached prior to June 1, a 20,000 pound trip limit would go into effect; if 90% of OY is reached on or after June 1, a 50,000 pound trip limit would go into effect. The primary reason for the increase is to avoid regulatory discarding in the Herring fishery. The proposed action is consistent with the MSB Fishery Management Plan (FMP) overfishing definition and is based on the most recent stock assessment information. This action is expected to yield positive social and economic benefits by maintaining the sustainability of the resource and should have no impacts on valued ecological components (i.e. biological components including protected resources and physical components including habitat) compared to the fishery as it was prosecuted under the 2008 specifications. A 50,000 pound trip limit after June 1 is unlikely to lead to a quota overage.

Illex squid (*Illex illecebrosus*)

The preferred alternative proposes: Max OY=ABC=IOY=DAH=DAP=24,000 mt, the same as in 2008. The proposed action is consistent with the FMP overfishing definition and is based on the most recent stock assessment information. This action is expected to yield positive social and economic benefits by maintaining the sustainability of the resource and should have no impacts on valued ecological components (i.e. biological components including protected resources and physical components including habitat) compared to the fishery as it was prosecuted under the 2008 specifications.

Butterfish

The preferred alternative proposes: Max OY= 12,175 mt, ABC= 1,500 mt, IOY=DAH=DAP= 500 mt, the same as in 2008. As such, no biological, economic, social, habitat or protected resource impacts are anticipated as a result of the proposed action compared to the fishery as it was prosecuted under the 2008 specifications. The Council is currently finalizing Amendment 10 to the FMP which will implement measures to reduce butterfish discards and rebuild the stock.

Loligo squid (*Loligo pealeii*)

The preferred alternative proposes: Max OY= 32,000 mt, ABC=IOY=DAH=DAP=19,000 mt. The preferred alternative represents a modest increase (12%) from the 2008 status quo but is consistent with the FMP overfishing definition and is based on the most recent stock assessment information, as implemented by Amendment 9 to the SMB FMP. This action is expected to yield positive social and economic benefits by maintaining the sustainability of the resource and should have no more than minimal adverse impacts on valued ecological components (i.e. biological components including protected resources and physical components including habitat) compared to the fishery as it was prosecuted under the 2008 specifications.

Table 1. Qualitative summary of expected impacts of specifications considered for 2009 compared to status quo.
(Preferred alternatives bolded. "+" signifies a positive impact, "-" a negative impact, and "0" a null impact. "0/" before "+" or "-" indicates a likely small impact)

	Environmental Dimensions				
Alternative	Managed Resource	Non-target Species	Human Communities	Protected Resources	Essential Fish Habitat
Alternative 1 - Atlantic mackerel (status quo/no action); ABC=156,000mt, IOY=DAH=115,000mt, DAP=100,000mt, JVP and TALFF=0mt. Same incidental trip limit (20,000 pounds).	0	0	0	0	0
Alternative 2 - Atlantic mackerel (preferred alternative); ABC=156,000mt, IOY=DAH= 115,000mt, DAP=100,000mt, JVP and TALFF=0mt. Proposed conditional trip limit (20,000/50,000 pounds).	0	0	0/+	0	0
Alternative 3 - Atlantic mackerel; ABC=156,000mt, IOY=DAH=115,000mt, DAP=100,000mt, JVP and TALFF=0mt. 50,000 pound incidental trip limit.	0 to 0/-	0 to 0/-	0/+ to 0/-	0 to 0/-	0 to 0/-
Alternative 1 - *Illex* (status quo/no action and preferred alternative); Max OY= ABC=IOY=DAH=DAP = 24,000mt, JVP and TALFF=0 mt.	0	0	0	0	0
Alternative 2 - *Illex*; Max OY=ABC=IOY=DAH=DAP=30,000mt, JVP and TALFF=0 mt.	-	0/-	+ (short term) - (long term)	0 to -	0 to -
Alternative 3 - *Illex*; Max OY= 24,000, ABC=IOY=DAH= DAP=19,000mt, JVP and TALFF=0 mt.	0/+	0/+	0 to -	0/+	0 to +
Alternative 1 - butterfish (status quo/no action and preferred);Max OY = 12,175, ABC=1,500mt, IOY=DAH=DAP=500mt, JVP and TALFF=0mt.	0	0	0	0	0
Alternative 2 - butterfish; Max OY = 12,175, ABC=4,545mt, IOY=DAH=DAP=1,681mt, JVP and TALFF=0mt.	0 to 0/-	0 to 0/-	0 to 0/+	0 to 0/-	0 to 0/-
Alternative 3 - butterfish; Max OY = 12,175, ABC=12,175mt, IOY=DAH=DAP=9,131 mt , JVP and TALFF=0mt.	0 to 0/-	0 to 0/-	0 to 0/+	0 to 0/-	0 to 0/-
Alternative 1 - *Loligo* (status quo/no action); Max OY = 26,000, ABC=IOY=DAH=DAP=17,000mt, JVP and TALFF=0mt.	0	0	0	0	0
Alternative 2 - *Loligo* (preferred); Max OY = 32,000, ABC=IOY=DAH=DAP=19,000mt, JVP and TALFF=0mt.	0	0 to 0/-	0 to 0/+	0 to 0/-	0 to 0/-
Alternative 3 - *Loligo*; Max OY = 32,000, ABC=IOY=DAH=DAP=23,000mt, JVP and TALFF=0mt.	0 to -	0 to -	+ to -	0 to -	0 to -

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2.0 LIST OF ACRONYMS

ASMFC	Atlantic States Marine Fisheries Commission or Commission
CI	Confidential Information
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
FMAT	Fishery Management Action Team
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 LISTS OF TABLES AND FIGURES

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4.0 INTRODUCTION AND BACKGROUND OF ANNUAL SPECIFICATION PROCESS

The Mid-Atlantic Fishery Management Council ("the Council") manages the Atlantic mackerel, squid, and butterfish (MSB) fisheries with the MSB Fishery Management Plan (FMP), pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA) as currently amended. The MSB FMP requires the Council to set annual specifications according to national standards specified in the MSA. The MSB fisheries are generally managed through quotas which are based principally on National Standard One, which requires that fishing mortality rates not exceed guidelines established in the MSA.

Per the MSB FMP, the Atlantic Mackerel, Squid and Butterfish Monitoring Committee met in Warwick, RI on May 21, 2008 and reviewed MAFMC staff recommendations for the 2009 quota and management recommendations. The Council considered the 2009 Monitoring Committee recommendations for specifications for all four species in the management unit at its June 2008 meeting in Atlantic City, NJ. This document serves as a vehicle for the formal submission to the Regional Administrator, Northeast Region, National Marine Fisheries Service ("the Regional Administrator") of A) the Council's recommendations for 2009 specifications, and B) related analyses supporting the recommendations. The analysis of the proposed measures' environmental impacts, and their significance, is discussed in accordance with the National Environmental Policy Act (NEPA) and National Oceanic and Atmospheric Administration Order (NAO) 216-6 formatting requirements for an Environmental Assessment (EA).

4.1 Purpose of and Need for the Action

The purpose of this action is to establish annual quotas and other measures, where necessary, that will meet the need to prevent overfishing and achieve optimum yield. The 2009 specifications are needed 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. Depending on market conditions and fish availability, failure to implement the preferred measures described in this document could result in overfishing and associated stock depletion. In the case of butterfish, failure to restrict fishing mortality would impede efforts to rebuild this overfished stock.

Regulations at 50 CFR Part 648 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 MSB FMP. The term IOY is used in these fisheries 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.

Current regulations allow for the specification of measures for a period of up to three years (subject to annual review). However, the Council has chosen to specify the measures proposed herein for a period of one year only (i.e., 2009) due to the recent and/or impending implementation of Amendments 9 and 10 to the MSB FMP.

4.2 Management Objectives of the MSB 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.

5.0 MANAGEMENT ALTERNATIVES

The alternatives were selected based on an evaluation of a range of specifications that stem from current or historical biologically based reference points (specified in the FMP) and various assumptions about stock status. The quotas recommended by the Council under the preferred alternatives are based on the target control rules specified in the FMP. The target control rules are based on the MSA definition of the term "optimum" which, with respect to the yield from a fishery, means the amount of fish which--(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

The status quo alternative is equivalent to the 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. Per the Regional Administrator's interpretation of recent amendments to the MSA, the Council was told that for 2009 measures, unless the Council's Science and Statistical Committee (SSC) provided fishing level recommendations that are at or above the Council's preferred alternatives, the Regional Administrator may disapprove the 2009 specifications on procedural grounds. In this case, the "roll-over" provision would mean that for 2009, the 2008 status quo specifications would prevail. The SSC was invited to the MSB Monitoring Committee meeting and provided with the relevant stock assessments and staff recommendations for the MSB species 20 business days before the June 2008 Council meeting, but the SSC was unable to provide fishing level recommendations due to time constraints; only one SSC member was able to attend the MSB Monitoring Committee meeting.

5.1 Alternatives for Atlantic mackerel

Changes to measures other than incidental trip limits during a directed fishery closure were not considered. Thus all measures maintain 2008 specifications that ABC = 156,000 mt, IOY=115,000 mt, DAH=115,000 mt, and DAP=100,000 (the Regional Administrator can increase the IOY up to, but not to exceed, the ABC specification through an in-season adjustment; see section 648.21 of the Federal Code of Regulations). Also, up to 3% of the IOY may be set aside for scientific research.

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

The specifications under this alternative would be ABC = 156,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt and JVP=0 and TALFF=0 mt (the DAH specification includes an allocation of 15,000 mt to the recreational fishery as per the FMP). These quotas are based on projections from SARC 42, the most recent mackerel stock assessment, and while based on the best available science, are possibly conservatively low, as will be discussed in Section 7 of this document. Implicit in this alternative is the ability of the Regional Administrator to increase the IOY up to, but not to exceed, the ABC specification through an in-season adjustment (see section 648.21 of the Federal Code of Regulations). Incidental trip limits during a directed fishery closure would remain at 20,000 pounds.

5.1.2 Alternative 2 for Atlantic mackerel (preferred alternative/intermediately restrictive)

The specifications under this alternative would be ABC = 156,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt and JVP=0 and TALFF=0 mt (the DAH specification includes an allocation of 15,000 mt to the recreational fishery as per the FMP). These quotas are based on projections from SARC 42, the most recent mackerel stock assessment, and while based on the best available science, are possibly conservatively low, as will be discussed in Section 7 of this document. Implicit in this alternative is the ability of the Regional Administrator to increase the IOY up to, but not to exceed, the ABC specification through an in-season adjustment (see section 648.21 of the Federal Code of Regulations). Like last year, the Council proposes that when 90% of the OY is landed or projected to be landed, the directed fishery for mackerel will close. However, if 90% of OY is reached prior to June 1, a 20,000 pound trip limit would go into effect for the balance of the fishing year; if 90% of OY is reached on or after June 1, a 50,000 pound trip limit would go into effect for the balance of the fishing year. The primary reason for the increase is to avoid regulatory discarding in the Herring fishery, and the increase would not be expected to lead to a quota overage. Industry identified the 50,000 pound trip limit after June 1 as an amount and time that would avoid potential regulatory discarding, primarily in the summer Gulf of Maine Herring fishery, without creating directed fishing during a closure (compared to the quota, minimal mackerel landings occur after June 1).

5.1.3 Alternative 3 for Atlantic mackerel (least restrictive)

The specifications under this alternative would be ABC = 156,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt and JVP=0 and TALFF=0 mt (the DAH specification includes an allocation of 15,000 mt to the recreational fishery as per the FMP). These quotas are based on projections from SARC 42, the most recent mackerel stock assessment, and while based on the best available science, are possibly conservatively low, as will be discussed in Section 7 of this document. Implicit in this alternative is the ability of the Regional Administrator to increase the IOY up to, but not to exceed, the ABC specification through an in-season adjustment (see section 648.21 of the Federal Code of Regulations). Incidental trip limits during a directed fishery closure would increase to 50,000 pounds, in effect for the balance of the fishing year. The primary reason for the increase is to avoid regulatory discarding in the Herring fishery. Industry identified the 50,000 pound trip limit to the Council as an amount that would avoid potential regulatory discarding, primarily in the summer Gulf of Maine Herring fishery. The Council voted to propose the conditional trip limit described in Alternative 2, and Alternative 3 in included for purposes of considering a range of Alternatives.

5.2 Alternatives for *Illex*

Changes to measures other than quotas were not considered. Thus all alternatives maintain that the directed fishery for *Illex* closes when 95% of ABC is taken (22,800 mt), and a 10,000 pound trip limit implemented for the remainder of the fishing year. Vessels which possess *Illex* incidental catch permits may land up to 10,000 pounds per trip at all times. Also, up to 3% of the ABC/IOY/DAH/DAP for *Illex* may be set aside for scientific research.

5.2.1 Alternative 1 for *Illex* (status quo/no action/preferred alternative/intermediately restrictive)

The specifications under this alternative would be Max OY=ABC= IOY=DAH=DAP=24,000 mt and JVP and TALFF = 0 mt. Since data limitations did not allow an update of yield estimates at the threshold and target fishing mortality rates in recent stock assessments, the Council recommended that IOY be specified at the yield associated with Fmsy, which is 24,000.

5.2.2 Alternative 2 for *Illex* (least restrictive)

The specifications under this alternative would be Max OY=ABC=IOY=DAH=DAP = 30,000 mt and JVP and TALFF = 0 mt. 30,000 mt was the quota from 1976-1995 and was presumably a historical MSY value estimation.

5.2.3 Alternative 3 for *Illex* (most restrictive)

The specifications under this alternative would be Max OY =24,000 mt, ABC=IOY=DAH= DAP=19,000 mt and JVP and TALFF = 0 mt. 19,000 mt was the quota from 1997-1999 and was associated in an older assessment (SAW 21 in 1996) with a fishing mortality rate that produced 50 percent of the maximum spawning potential of the stock (http://www.epa.gov/fedrgstr/EPA-

SPECIES/1998/November/Day-17/e30692.htm).

5.3 Alternatives for Butterfish

Changes to measures other than quotas were not considered. Thus all alternatives maintain the trip limit of 5,000 pounds for moratorium butterfish permits, and maintain the threshold for butterfish minimum mesh requirement (3.0 inches) at 1,000 pounds. Also, the threshold level for directed butterfish fishery closure will still be 80% of DAH. If 80% of DAH is reached prior to Oct 1, a 250 pound daily trip limit results. If 80% of DAH is reached on/after Oct 1, a 600 pound daily trip limit results. Incidental limits are 600 pounds, reduced to 250 pound if the directed fishery closes before Oct 1. Also, Up to 3% of the IOY/DAH/DAP for butterfish may be set aside for scientific research.

5.3.1 Alternative 1 for butterfish (preferred alternative/status quo/no action/most restrictive)

The specifications under this alternative would be Max OY = 12,175 mt, ABC = 1,500 mt, and IOY=DAH=DAP=500 mt and JVP and TALFF = 0 mt. This quota, which assumes discards are double landings (per the latest stock assessment), is designed to minimize directed fishing while Amendment 10 is developed to rebuild butterfish. An ABC of 1,500 mt, which is approximately equivalent to an F of 0.1, has been shown to facilitate rebuilding given average recruitment levels.

5.3.2 Alternative 2 for butterfish (less restrictive, equivalent to 2005-2007 measures)

The specifications under this alternative would be Max OY = 12,175 mt, ABC = 4,545 mt, and IOY=DAH=DAP=1,681 mt and JVP and TALFF = 0 mt. It is based on analyses presented in SARC 38 and an assumption that biomass is the same as it was 2000-2002.

5.3.3 Alternative 3 for butterfish (least restrictive)

The specifications under this alternative would be Max OY = 12,175 mt and ABC = 12,175 mt, and IOY=DAH=DAP=9,131 mt and JVP and TALFF = 0 mt. It represents that application of the F target control rule for a rebuilt stock (and does not take into account that discards are estimated to equal twice landings). This alternative was under consideration to be eliminated but has been included because the butterfish stock has the potential to rebuild quickly, and once rebuilt these are the specifications that would result from the FMP control rule.

5.4 Alternatives for *Loligo* squid

Changes to measures other than quotas were not considered. Thus under all alternatives quota will still allocated by trimesters: January-April (43%), May-August (17%) and September-December (40%). For trimesters 1 and 2, the directed fishery will be closed when 90% of each Trimester allocation is taken; vessels will be restricted to a 2,500 pound trip limit for the remainder of the period. Overages and underages from the first two trimesters will be added to or deducted from period 3. When 95% of the total annual quota has been taken (i.e., 18,050 mt), a 2,500 pound trip limit will be implemented for the rest of the fishing year. Vessels which possess *Loligo* incidental catch permits may land up to 2,500 pounds per trip at all times. Also, Up to 3% of the ABC/IOY/DAH/DAP may be set aside for scientific research. These measures represent the status quo.

5.4.1 Alternative 1 for *Loligo* (status quo/no action/most restrictive)

The specifications under this alternative would be Max OY =26,000 mt, ABC, IOY, DAH, and DAP = 17,000 mt and JVP and TALFF = 0 mt. This quota would be based methods developed before Amendment 9 to the SMB FMP implemented the recommendations of the latest stock assessment, SARC 34. Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 7,310mt; Trimester 2: 2,890mt; and Trimester 3: 6,800mt.

5.4.2 Alternative 2 for *Loligo* (preferred/intermediately restrictive)

The specifications under this alternative would be Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0 mt. This quota is based on the technical and management recommendations of the latest stock assessment, SAW/SARC 34. The technical recommendations of SAW/SARC 34 included revisions to the proxies for target and threshold fishing mortality rates. The new proxies lead to the specifications described below in Alternative 3. However, SAW/SARC 34 also noted that the fishery has supported catches around 20,000 over the long term and provided as management advice to continue the current catch of 20,000 (including discards), which is why this alternative sets 19,000 as the effective quota. Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 8,170mt; Trimester 2: 3,230mt; and Trimester 3: 7,600mt.

5.4.3 Alternative 3 for *Loligo* (least restrictive)

The specifications under this alternative would be Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 23,000 mt and JVP and TALFF = 0 mt. This quota is based on the technical recommendations of the latest stock assessment, SARC 34 (but not the management advice which was to limit landings to 19,000 mt). Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 9,890mt; Trimester 2: 3,910mt; and Trimester 3: 9,200mt.

6.0 DESCRIPTION OF AFFECTED ENVIRONMENT AND FISHERIES

This section identifies and describes the *valued ecosystem components* (VECs) (Beanlands and Duinker 1984) likely to be affected by the actions proposed in this document. The VECs comprise the affected environment within which the proposed actions will take place. The VECs are identified and described here as a means of establishing a baseline for the impact analysis that will be presented in section 7 "Analysis of Impacts." The significance of the various impacts of the proposed actions on the VECs will be assessed from a cumulative effects perspective. The range of VECs is described in this section is limited to those for which a reasonable likelihood of meaningful impacts could potentially be expected (CEQ 1997). These VECs are listed below.

1. Managed resources (Atlantic mackerel, *Loligo* and *Illex* squid and butterfish)
2. Non-target species
3. Habitat including EFH for the managed resources and non-target species
4. Endangered and other protected resources
5. Human communities

The physical environment is described next, to establish the context for the VECs, and will be followed by the description of the actual VECs.

6.1 Physical Environment

Climate, physiographic, and hydrographic differences separate the Atlantic ocean from 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 (though the division is probably better thought of as a mixing zone rather than as a definitive boundary). The MSB fisheries are prosecuted in the New England-Middle Atlantic Area. 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). In the New England-Middle Atlantic area, 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. 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 ^{o}F in the New York Bight in February to over 80 ^{o}F off Cape Hatteras in August.

Within the New England-Middle Atlantic Area, the principal area within which the MSB 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 (Figure 1). A number of distinct subsystems comprise the region, including the Gulf of Maine, Georges Bank, and the 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. Figure 2 provides a zoomed in view of Figure 1 detailing the Core Geographic scope of the Atlantic mackerel, squid and butterfish fisheries.

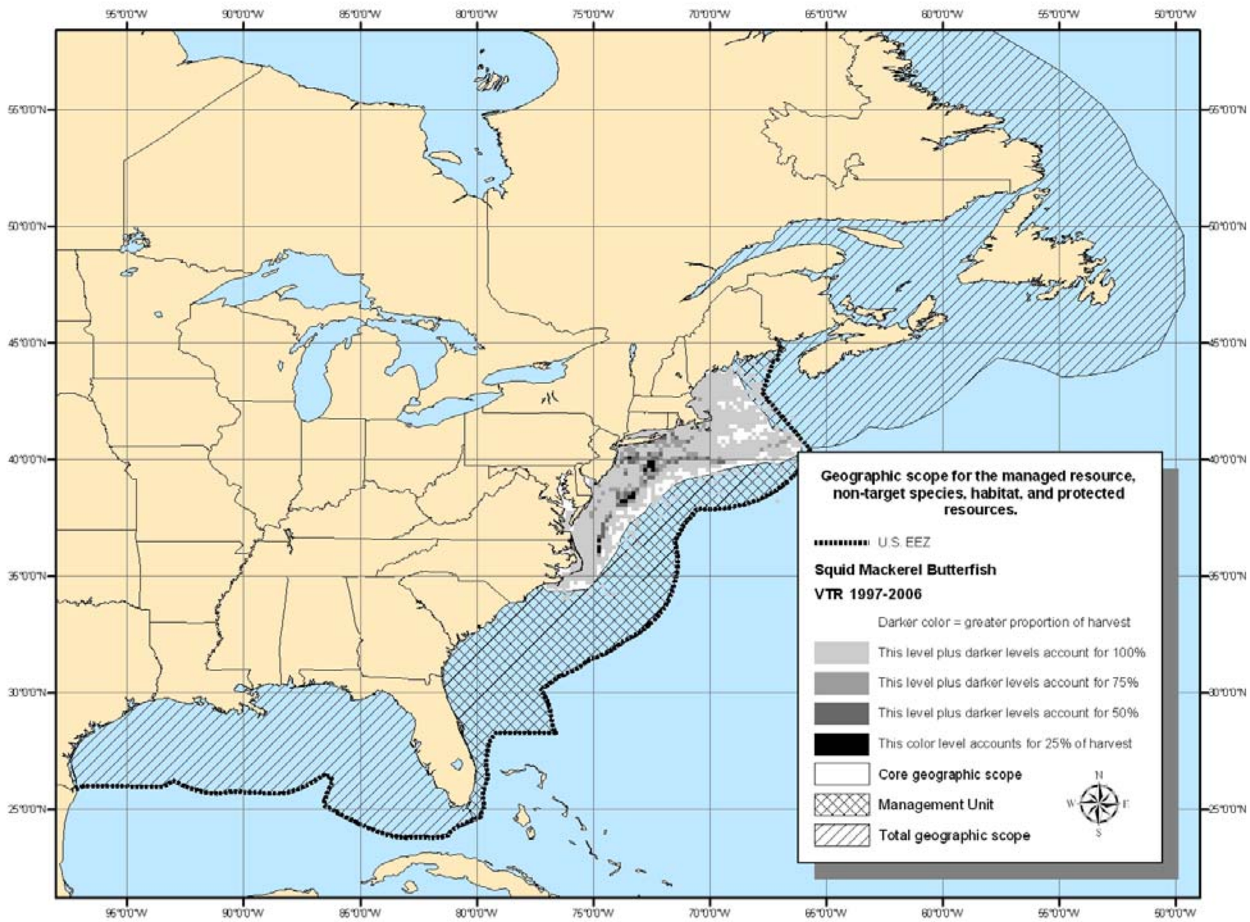

Figure 1. Geographic scope of the Atlantic mackerel, squid and butterfish fisheries.

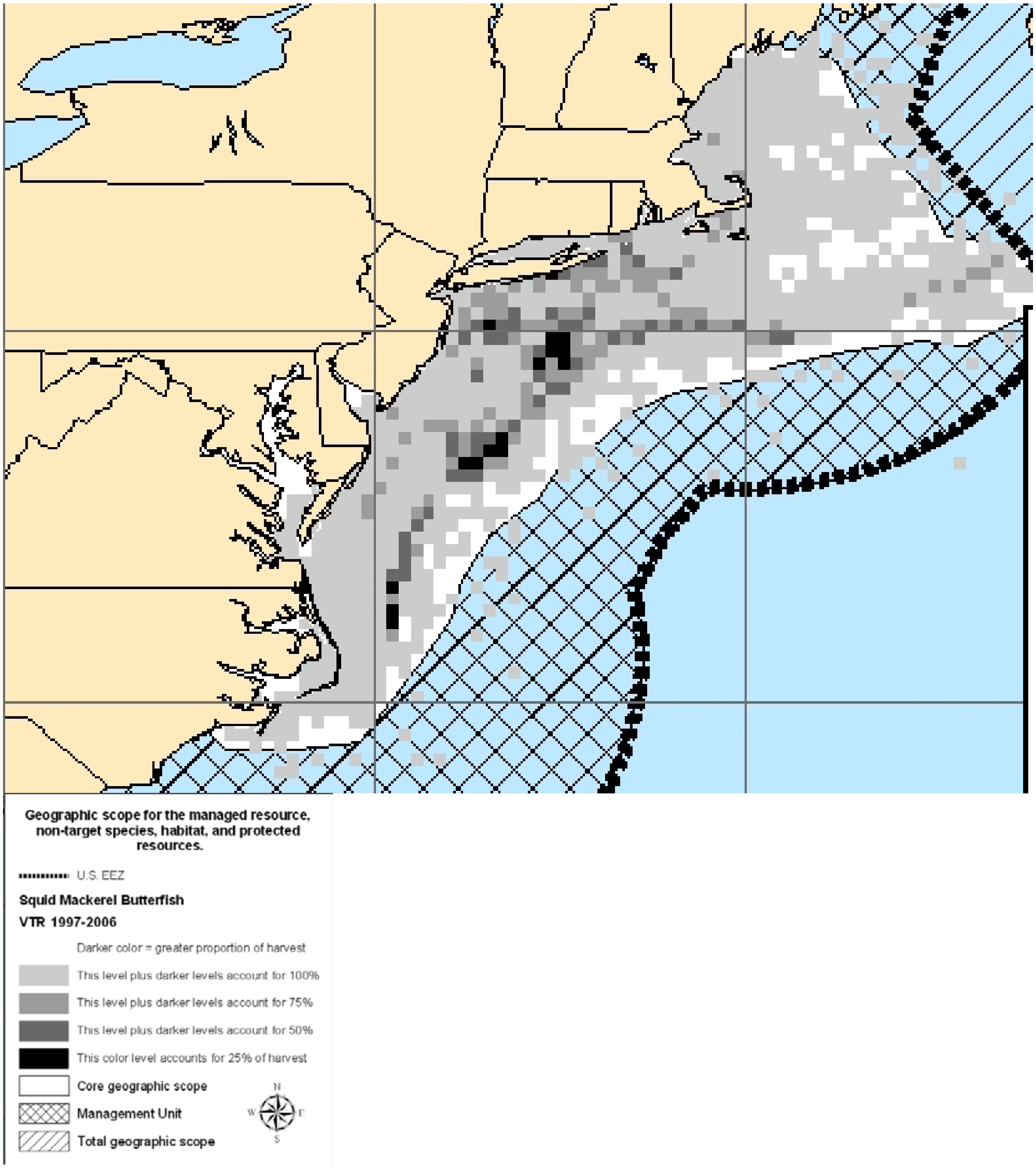

Figure 2. Detail of Core Geographic scope of the MSB fisheries.

The Council has been requested via previous public comments to include mention that numerous old dump sites for municipal and industrial waste exist in the management area, specifically the "106-Mile Dump Site " formerly utilized east of Delaware's ocean coastline, beyond the Continental Shelf . Detailed information on the 106-Mile Dump Site can be found in the 1995 EPA report to Congress on the 106-Mile Dump Site available at: http://www.epa.gov/adminweb/history/topics/mprsa/Monitoring,%20Research%20and%20Surveillance%20of%20the%20106%20Mile%20Deepw.pdf. It generally concluded that sewage sludge did not reach important areas for commercial fisheries and that the 106-Mile Dump Site was not the prime source of the generally low chemical contamination in tilefish, the primary commercially important finfish species resident in the shelf/slope areas adjacent to the 106-Mile Dump Site (EPA 1995).

6.2 Biology of the Managed Resources

6.2.1 Atlantic mackerel

Atlantic mackerel is a pelagic, schooling species distributed between Labrador (Parsons 1970) and North Carolina (Anderson 1976a). A southern group begins its spring migration from waters off North Carolina and Virginia in March- April, and moves 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 before moving southward and returning to deep offshore water near Block Island after October (Hoy and Clark 1967). The northern group 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 group begins its southerly autumn migration in November and December and disappears into deep water off Cape Cod. Thus both groups make extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summer feeding grounds. Both groups overwinter between Sable Island (off Nova Scotia) and Cape Hatteras in water generally warmer than 45 F (USDC 1984a).

Biochemical studies (Mackay 1967) have not established that genetic differences exist between the two groups and precise estimates of the relative contributions of the two groups cannot be made (ICNAF 1975). Since 1975 all Atlantic mackerel in the northwest Atlantic have been assessed as a unit stock (Anderson 1982) and are considered one stock for fishery management purposes.

Mackerel spawning occurs during spring and summer and progresses from south to north. The southern group spawns from mid-April to June in the Mid-Atlantic Bight and the Gulf of Maine and the northern group 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 ^{o}F, with a peak around 50-54 ^{o}F (Grosslein and Azarovitz 1982).

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 ^{o}F, 5.5 days at 55 ^{o}F, and 4 days at 61^{o}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 (Anderson and Paciorkowski 1978). 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. 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). The maximum age observed is 17 years (Pentilla and Anderson 1976).

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, euphausiid, 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 mortality is probably the largest component of natural mortality on this stock (Overholtz *et al.* 1991b). Atlantic mackerel are an important prey species and are known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals and seabirds (Smith and Gaskin 1974; Payne and Selzer 1983; Overholtz and Waring 1991; Montevecchi and Myers 1995; Scott and Tibbo 1968; Maurer and Bowman 1975; Stillwell and Kohler 1982, 1985; Bowman and Michaels 1984).

The status of the Atlantic mackerel stock is described in Section **6.6.1.**

6.2.2 *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 terminal spawner with a protracted spawning season. There have been no direct observations of spawning in nature. The winter spawning area is believed to be south of Cape Hatteras over the Blake Plateau (Black *et al.* 1987), but other spawning occurs between the Florida Peninsula and central New Jersey at depths down to 990 ft (300 m; Fedulov and Froerman 1980). Some spawning may also occur in the northern part of the Gulf Stream/Slope Water frontal zone (Dawe and Beck 1985, O’Dor and Balch 1985, Rowell et al 1985). However, the only confirmed spawning area is located in the mid-Atlantic Bight where a large number of mated females have been collected during May in the vicinity of the US fishing grounds (Hendrickson, 2004, Hendrickson and Hart, 2006).

Illex 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 scalping (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 *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 *Illex* consume less crustaceans and more fish as they grow larger.

Illex are an important prey species and are known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals, seabirds, and *Loligo* squid (Butler 1971, Vinogradov 1972, Maurer 1975, Buckel 1997, Langton and Bowman 1977, Lilly and Osborne 1984, Templeman 1944, Stillwell and Kohler 1985, Scott and Scott 1988, Squires 1957, Wigley 1982, Major 1986, and Brown *et al.*1981).

The status of the *Illex* stock is described in Section **6.6.2.**

6.2.3 Butterfish

Butterfish spawning takes place chiefly during summer (June- August) in inshore waters generally less than 100' deep and over 60 ^{o}F.. The times and duration of spawning are closely associated with changes in surface water temperature. 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 are 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).

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. 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 an important prey species known to be preyed on by a variety of bony fish, sharks, *Loligo* squid, marine mammals, and seabirds (Bigelow and Schroeder 1953, Scott and Tibbo 1968, Horn 1970a, Maurer and Bowman 1975, Tibbets 1977, Stillwell and Kohler 1985, Brodziak 1995a, SAW 38).

The status of the butterfish stock is described in Section **6.6.3.**

6.2.4 *Loligo pealei*

Statolith ageing studies of *Loligo pealeii* have indicated a life span of less than one year (Macy 1992, Brodziak and Macy 1996). Consequently, all recent stock assessments for *Loligo* have been conducted under the assumption that the species has a semelparous (i.e., 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 usually attaches it to a preexisting cluster of newly spawned eggs (clusters are initiated on rocks, sand, and seaweeds). 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 (Jacobson 2005, 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.

Loligo are an important prey species and are known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals, seabirds, and *Illex* squid (Lange and Sissenwine 1980, Vovk and Khvichiya 1980, Summers 1983, Waring *et al.* 1990, Overholtz and Waring 1991, Gannon *et al.* 1997, Maurer 1975, Langton and Bowman 1977, Gosner 1978, Lange 1980, Vinogradov 1984).

The status of the *Loligo* stock is described in Section **6.6.4.**

6.3 Habitat (Including Essential Fish Habitat (EFH))

Pursuant to the Magnuson Stevens Act / EFH Provisions (50 CFR Part 600.815 (a)(1)), an FMP must describe EFH by life history stage for each of the managed species in the plan. This information was previously described in Amendment 8 to the MSB FMP and will be reviewed in Amendment 11 to the MSB FMP. EFH for the managed resource is described using fundamental information on habitat requirements by life history stage that is summarized in a series of documents produced by NMFS and available at: http://www.nefsc.noaa.gov/nefsc/habitat/efh/. This series of documents, as well as additional reports and publications, were used to provide the best available information on life history characteristics, habitat requirements, as well as ecological relationships. 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 described above. Amendment 8 to the MSB FMP identified and described essential fish habitat for Atlantic mackerel, *Loligo* (except for eggs), *Illex,* and butterfish, summarized below. Amendment 9 to the MSB FMP identified and described essential fish habitat for *Loligo* eggs.

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 log-transformed 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 ^{o}F and 73 ^{o}F.

Larvae: Atlantic mackerel larvae are collected in depths between 33 ft and 425 ft and temperatures between 43 ^{o}F and 72 ^{o}F.

Juveniles: Juvenile Atlantic mackerel are collected from shore to 1050 ft and temperatures between 39 ^{o}F and 72 ^{o}F.

Adults: Adult Atlantic mackerel are collected from shore to 1250 ft and temperatures between 39 ^{o}F and 61 ^{o}F.

Illex

The *Illex* 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. *Illex* pre-recruits are less than or equal to 10 cm and recruits are greater than 10 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 log-transformed catch for each of the life stages (pre-recruits and recruits) where *Illex* were collected in the NEFSC trawl surveys. Generally, pre-recruit *Illex* are collected from shore to 600 ft and temperatures between 36 ^{o}F and 73 ^{o}F, while recruited *Illex* are collected from shore to 600 ft and temperatures between 39 ^{o}F and 66 ^{o}F.

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 ^{o}F and 63 ^{o}F.

Larvae: butterfish larvae are collected in depths between 33 ft and 6000 ft and temperatures between 48 ^{o}F and 66 ^{o}F.

Juveniles: juvenile butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37 ^{o}F and 82 ^{o}F.

Adults: adult butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37 ^{o}F and 82 ^{o}F.

Loligo

The *Loligo* population is comprised of pre-recruits and recruits. *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 log-transformed 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 ^{o}F and 27 ^{o}F, while recruited *Loligo* are collected from shore to 1000 ft and temperatures between 39 ^{o}F and 81 ^{o}F.

Amendment 9 to the MSB FMP established EFH for *Loligo* squid eggs as rocks, boulders, and aquatic vegetation in the shaded areas described in the Figure 3.

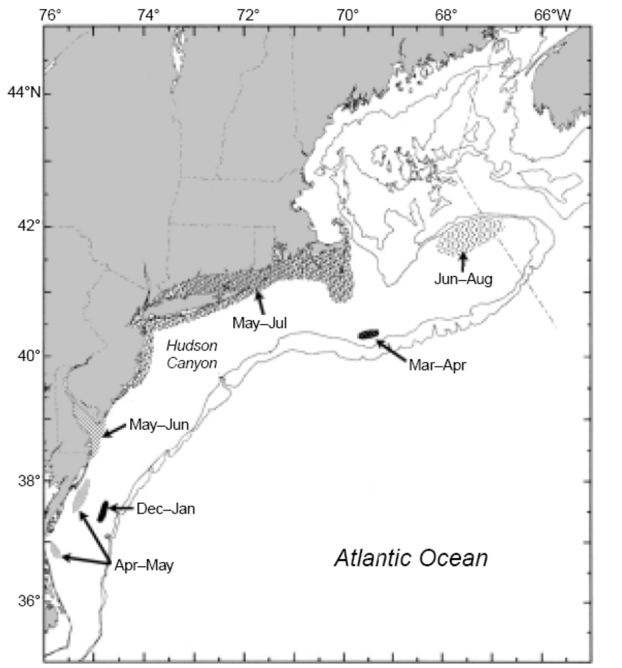

Figure 3. Loligo egg EFH Designation.

6.4 Endangered and 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). Eleven are classified as endangered or threatened under the ESA, while the rest are protected by the provisions of the MMPA. The subset of these species that are known to have interacted with the SMB fisheries is provided in this document section. 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:

* = Known to have interacted with SMB 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, Great South Channel

Protected Species Interactions with the Managed Resources – Includes Fishery Classification under Section 118 of Marine Mammal Protection Act

Species	Status
Common dolphin (*Delphinus delphis*)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

Under section 118 of the MMPA, the NMFS must publish and annually update the List of Fisheries (LOF), which places all U.S. 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 Potential Biological Removal (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. PBR is the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997).

Under Tier 2, individual fisheries are subject to the following categorization:

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

Category 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

Category 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 annual mortality and serious injury of a stock in a given fishery is less than or equal to 10% of the PBR level or, 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 or, in the absence of reliable information it is at the discretion of the Assistant Administrator (AA) for Fisheries to determine whether the incidental injury or mortality qualifies (or not) for a specific category.

Marine Mammal Stock Assessment Reports:

As required by the Marine Mammal Protection Act (MMPA), NMFS has incorporated earlier public comments into revisions of marine mammal stock assessment reports. These reports contain information regarding the distribution and abundance of the stock, population growth rates and trends, the stock's Potential Biological Removal level, estimates of annual human-caused mortality and serious injury from all sources, descriptions of the fisheries with which the stock interacts, and the status of the stock. The MMPA requires these assessments to be reviewed at least annually for strategic stocks and stocks for which significant new information is available, and at least once every 3 years for non-strategic stocks.

The final 2007 individual stock assessment reports, as well as regional compilations, are available at http://www.nmfs.noaa.gov/pr/sars/. The "U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2008" report is also available online at: http://www.nefsc.noaa.gov/nefsc/publications/tm/tm201/.

NMFS elevated the (mid-water) SMB fishery to Category I in the 2001 LOF but it was reduced to a Category II fishery in 2007 (see discussion below describing the Atlantic Trawl Gear Take Reduction Plan). Trawl fisheries targeting squid occur mainly in southern New England and Mid-Atlantic waters and typically use small mesh otter trawls throughout the water column. Trawl fisheries targeting mackerel occur mainly in southern New England and Mid-Atlantic waters and generally operate in mid-water. Butterfish are predominately caught incidental to directed squid and mackerel trawl fisheries. The reduction in interactions documented between the SMB fisheries and several species/stocks of marine mammals compared to previous years led to the re-classification. The proposed List of Fisheries for 2009 is now available at the following internet website address: http://www.nmfs.noaa.gov/pr/interactions/lof/#lof). No changes which would affect the classification of the fisheries managed under this FMP are proposed for 2009. However, NMFS is proposing to modify the Category II "Mid-Atlantic Bottom Trawl Fishery" to include the Atlantic mackerel, squid and butterfish fisheries because these species are taken with bottom otter trawls in the Mid-Atlantic region.

Based on data presented in the 2007 Stock Assessment Report (SAR), PBR is 1,000, 364, and 249 for common dolphin, white sided dolphin and *Goblicephla* sp., respectively. The corresponding average annual mortality from all fisheries is 151, 38 and 201 for common dolphin, white sided dolphin and *Goblicephla* sp, respectively. The annual serious injury and mortality across all fisheries for common dolphin, white sided dolphin, and pilot whales does not exceed PBR, therefore each stock is not considered to be a strategic stock.

6.4.1 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 and, as discussed above, have had documented interactions with fishing gears used to harvest species managed under this FMP. This following species of cetaceans are known to interact with the Atlantic Mackerel Squid and Butterfish fisheries:

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. 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. Unpubl. Ms.). Selzer and Payne (1988) reported very large aggregations (greater than 3,000 animals) on Georges Bank in autumn. Common dolphins are occasionally found in the Gulf of Maine (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).

Total numbers of common dolphins off the USA or Canadian Atlantic coast are unknown, although several estimates from selected regions of the habitat do exist for selected time periods. The best abundance estimate for common dolphins is 120,743 animals (CV= 0.23). The minimum population size is 99,975. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be .0.5 because the CV of the average mortality estimate is less than 0.3 (Wade and Angliss 1997), and because this stock is of unknown status. PBR for the western North Atlantic common dolphin is 1000.

Fishery Interactions

The following information was taken from the latest stock assessment for common dolphin contained in Waring *et al.* (2008) which summarizes incidental mortality of this species through 2004.

Illex Squid

No incidental takes of common dolphins have been observed in the *Illex* fishery.

Loligo Squid

All incidental takes attributed to this fishery were observed during the first quarter of the year (Jan-Mar), exclusively in the offshore fishery. The estimated fishery-related mortality of common dolphins attributable to the fall/winter offshore fishery was 0 between 1997-1998, 49 in 1999 (CV=0.97), 273 in 2000 (CV=0.57), 126 in 2001 (CV=1.09) and 0 in 2002-2003. The average annual mortality between 1999-2003 was 90 common dolphins (CV=0.47). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

Atlantic Mackerel

The estimated fishery-related mortality attributed to this fishery was 161 (CV=0.49) animals in 1997 and zero between 1999-2003. A U.S. joint venture (JV) fishery was conducted in the mid-Atlantic region from February-May 1998. NMFS maintained 100% observer coverage on the foreign JV vessels where 152 transfers from the U.S. vessels were observed. Seventeen incidental takes of common dolphin were observed in the 1998 JV mackerel fishery. This fishery did not operate in 1999-2003.

Mid-Atlantic Bottom Tra**wl**

Two common dolphins were observed taken in the mid-Atlantic bottom trawl fishery in 2001, nine in 2004, and 15 in 2005 (Waring *et al*, 2008).

White-sided dolphin (*Lagenorhynchus acutus*)

White-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily in continental shelf waters to the 100m depth contour. The species inhabits waters from central West Greenland to North Carolina (about 35° 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: Gulf of Maine, Gulf of St. Lawrence and Labrador Sea stocks (Palka et al. 1997). Evidence for a separation between the well documented unit in the southern Gulf of Maine and a Gulf of St. Lawrence population comes from a hiatus of summer sightings along the Atlantic side of Nova Scotia. This has been reported in Gaskin (1992), is evident in Smithsonian stranding records, and was seen during abundance surveys conducted in the summers of 1995 and 1999 that covered waters from Virginia to the entrance of the Gulf of St. Lawrence. White-sided dolphins were seen frequently in Gulf of Maine waters and in waters at the mouth of the Gulf of St. Lawrence, but only a few sightings were recorded between these two regions. 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 May, 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, particularly around Hudson Canyon, have been seen at all times of the year but at low densities. Prior to the 1970's, white-sided dolphins in U.S. waters were found primarily offshore on the continental slope, while whitebeaked dolphins (L. albirostris) were found on the continental shelf. During the 1970's, there was an apparent switch in habitat use between these two species. This shift may have been a result of the decrease in herring and increase in sand lance in the continental shelf waters (Katona et al. 1993; Kenney et al. 1996).

The following abundance information was taken from the latest stock assessment for white-sided dolphin contained in Waring *et al* (2008). The total number of white-sided dolphins along the eastern USA and Canadian Atlantic coast is unknown. The best available current abundance estimate for white-sided dolphins in the western North Atlantic 63,368 (CV=0.27). The minimum population size is 50,883. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because this stock is of unknown status and the CV of the mortality estimate is between less than 0.3. PBR for the Gulf of Maine stock of white-sided dolphin is 509.

Fishery Interactions

The following information was taken from the latest stock assessment for white-sided dolphin contained in Waring *et al* (2008) which summarizes incidental mortality of this species through 2005.

Illex squid

According to Waring *et al*. (2007), no white-sided dolphin takes have been observed taken incidental to *Illex* squid fishing operations since 1996.

Loligo squid

According to Waring *et al*. (2007), no white-sided dolphin takes have been observed taken incidental to *Loligo* squid fishing operations since 1996.

Atlantic mackerel

NMFS observers in the Atlantic foreign mackerel fishery reported 44 takes of Atlantic white-sided dolphin incidental to fishing activities in the continental shelf and continental slope waters between March 1977 and December 1991 (Waring et al. 1990; NMFS unpublished data). This total includes 9 documented takes by U.S. vessels involved in joint-venture fishing operations in which U.S. captains transfer their catches to foreign processing vessels. No incidental takes of white-sided dolphin were observed in the Atlantic mackerel JV fishery when it was observed in 1998. One white-sided dolphin incidental take was observed in 1997 and none since then.

Northeast Mid-water Trawl Fishery (Including Pair Trawl)

The two most commonly targeted fish in this fishery are herring and mackerel. The observer coverage in this fishery was highest after 2003, although a few trips in earlier years were observed. A white-sided dolphin was observed taken in the single trawl fishery on the northern edge of Georges Bank during July 2003 in a haul targeting herring. A bycatch rate model described in Waring *et al.* (2008) provided annual fishery-related mortality (CV in parentheses) estimates in this fishery as follows: 2001-2002 unknown, 24 (0.56) in 2003, 19 (0.58) in 2004, and 15 (0.68) in 2005. The average annual estimated fishery-related mortality during 2001-2005 was 19 (0.35).

Mid-Atlantic Mid-water Trawl Fishery (Including Pair Trawl)

The two most commonly targeted fish in this fishery are herring and mackerel. The observer coverage in this fishery was highest after 2003, although a few trips in other years were observed. A white-sided dolphin was observed taken in the pair trawl fishery near Hudson Canyon (off New Jersey) during February 2004 in a haul targeting mackerel (but landing nothing). The following annual fishery-related mortality (CV in parentheses) estimates are given in Waring *et al.* (2008): 2001-2002 unknown, 51 (0.46) in 2003, 105 (0.38) in 2004, and 97

(0.76) in 2005. The average annual estimated fishery-related mortality during 2001-2005 was 84 (0.34).

Mid-Atlantic Bottom Trawl Fishery

One white-sided dolphin incidental take was observed in 1997. Recently observer coverage for this fishery has been about 1%, except for 2004 when it was 3% (Waring *et al*. 2007). Estimated annual fishery related mortality mortalities (CV in parentheses) were 27 (0.19) in 2001, 25 (0.17) in 2002, 31 (0.25) in 2003, 26 (0.20) in 2004, and 38 (0.29) in 2005. The 2001-2005 average annual mortality attributed to the mid-Atlantic bottom trawl fishery was 29 animals (CV=0.11).

Long-finned (*Globicephala melas*) and short-finned (*Globicephala macrorhynchus*) 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 (*Globicephala* sp.) 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; 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 (Leatherwood *et al.* 1976; Abend 1993; Buckland *et al.* 1993). The stock structure of the North Atlantic population is uncertain (Fullard *et al.* 2000). Recent morphometrics and genetics (Siemann 1994; Fullard *et al.* 2000) studies have provided little support for stock structure across the Atlantic (Fullard *et al.* 2000). Fullard *et al.* (2000) have proposed a stock structure that is correlated to sea surface temperature: 1) a cold-water population west of the Labrador/North Atlantic current and 2) a warm-water population that extends across the Atlantic in the Gulf Stream (Waring *et al.* 2002).

The short-finned pilot whale is distributed worldwide in tropical to warm temperate water (Leatherwood and Reeves 1983). The northern extent of the range of this species within the USA Atlantic Exclusive Economic Zone (EEZ) is generally thought to be Cape Hatteras, North Carolina (Leatherwood and Reeves 1983). Sightings of these animals in U.S. Atlantic EEZ occur primarily within the Gulf Stream [Southeast Fisheries Science Center (SEFSC) unpublished data], and along the continental shelf and continental slope in the northern Gulf of Mexico. There is no information on stock differentiation for the Atlantic population (Waring *et* *al*. 2002).

The total number of pilot whales off the eastern USA and Canadian Atlantic coast is unknown, although the best 2004 abundance estimate for *Globicephala sp*. is the sum of the estimates from the two 2004 U.S. Atlantic surveys (31,139), where the estimate from the northern U.S. Atlantic is 15,728, and the southern U.S. Atlantic is 15,411 (CV =0.428). This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat. The minimum population size for *Globicephala sp*. is 24,886. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because the CV of the average mortality estimate is less than 0.3 (Wade and Angliss 1997) and because this stock is of unknown status. PBR for the western North Atlantic *Globicephala sp*. is 249.

Fishery Interactions

The following information was taken from the latest stock assessment for pilot whales contained in Waring *et al.* (2008) which summarizes incidental mortality of these species through 2005.

<u>*Illex* Squid</u>

Since 1996, 45% of all pilot whale takes observed were caught incidental to *Illex* squid fishing operations; 1 in 1996, 1 in 1998 and 2 in 2000. Annual observer coverage of this fishery has varied widely and reflects only the months when the fishery is active. The estimated fishery-related mortality of pilot whales attributable to this fishery was: 45 in 1996 (CV=1.27), 0 in 1997, 85 in 1998 (CV=0.65), 0 in 1999, 34 in 2000 (CV=0.65), unknown in 2001-2002 due to no observer coverage, and 0 in 2003. The average annual mortality between 1999-2003 was 11 pilot whales (CV=0.65).

<u>*Loligo* Squid</u>

Only one pilot whale incidental take has been observed in *Loligo* squid fishing operations since 1996. The one take was observed in 1999 in the offshore fishery. No pilot whale takes have been observed in the inshore fishery. The estimated fishery-related mortality of pilot whales attributable to the fall/winter offshore fishery was 0 between 1996 and 1998, 49 in 1999 (CV=0.97) and 0 between 2000 and 2003. The average annual mortality between 1999-2003 was 10 pilot whales (CV=0.97). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

<u>Atlantic Mackerel</u>

No incidental takes of pilot whales have been observed in the mackerel fishery. The former distant water fleet fishery has been non-existent since 1977. There is also a mackerel trawl fishery in the Gulf of Maine that generally occurs during the summer and fall months (May-December) (Clark ed. 1998). There have been no observed incidental takes of pilot whales reported for the Gulf of Maine fishery.

Mid-Atlantic Bottom Trawl

Two pilot whales were taken in the Mid-Atlantic bottom trawl fishery in 200 and four in 2005. The estimated fishery related mortality to pilot whales in the US Atlantic attributable to this fishery (CV in parentheses) was: 39 (0.31) in 2001, 38 (0.36) in 2002, 31 (0.31) in 2003, 35 (0.33) in 2004 and 31 (0.31) in 2005. The 2001-2005 average mortality attributed to the Mid-Atlantic bottom trawl fishery was 28 animals (CV=0.15).

Northeast Mid-Water Trawl – Including Pair Trawl

The observer coverage in this fishery was highest after 2003, though a few trips in earlier years were observed. A pilot whale was observed taken in the single trawl fishery on the northern edge of Georges Bank in a haul targeting herring. Estimated annual fishery-related mortalities (CV in parentheses) unknown in 2001-2002, 1.9 (0.56) in 2003, 1.4 (0.58) in 2004, 1.1 (0.68) in 2005. The average annual estimated fishery-related mortality during 2001-2005 was one 1 (0.35).

Mid-Atlantic Mid-Water Trawl – Including Pair Trawl

The observer coverage in this fishery was highest after 2003, though a few trips in earlier years were observed. No pilot whales were observed taken in this fishery between 2001 -2005.

6.4.2 Atlantic Trawl Gear Take Reduction Team and Take Reduction Plan

The Atlantic Trawl Gear (ATG) Take Reduction Team (TRT) was established in 2006 as a result of a 2003 settlement agreement with the Center for Biological Diversity, with the goal of reducing serious injury and mortality (bycatch) of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), white-sided dolphins (*Lagenorhynchus acutus*), and common dolphins (*Delphinus delphis*) in the Mid-Atlantic Mid-water Trawl fishery, which is part of the MSB fishery.

There is no timeline within the MMPA requiring the ATGTRT to submit a draft TRP because all the fisheries affected by the ATGTRT are Category II fisheries and none of the stocks under the ATGTRP are strategic at this time. However, NMFS requested that the TRT make the best effort possible to meet the original 11 month obligation to develop a TRP. While unable to agree on whether to develop a TRP within the 11 month timeframe, TRT members did agree that developing a research plan would maintain progress towards reducing the serious injury and mortality of marine mammals in Atlantic trawl fisheries. The finalized consensus strategy, which is not a TRP, was described in previous specifications EAs and can be found, along with other ATGTRT documentation at : http://www.nero.noaa.gov/prot_res/atgtrp/.

Under the framework of section 118 of the Marine Mammal Protection Act (MMPA), the ATGTRT will aim to draft a Take Reduction Plan (TRP) that reduces bycatch of these stocks to insignificant levels approaching a zero mortality and serious injury rate (known as the Zero Mortality Rate Goal, or ZMRG), taking into account the economics of the fishery, the availability of existing technology, and existing state or regional fishery management plans, within five years of implementation. NMFS has identified ZMRG as ten percent of the Potential Biological Removal (PBR) rate, which is defined as the maximum level of mortality (excluding natural deaths) that will not harm a particular stock. The relevant cetacean populations are currently below their respective PBR levels.

The ATGTRT is gear-based. Although white-sided dolphins were not originally included in the settlement agreement, NMFS decided to include them under the ATGTRT's purview. When looking at the data for the relevant gear type, NMFS found that the bycatch rate of this species was below PBR, but above the insignificant threshold, similar to the other species addressed in the settlement agreement.

6.4.3 Description of Turtle Species with Documented Interactions with the SMB Fisheries

Note: Related to the bycatch of loggerhead turtles in MSB fisheries (Murray 2006), Endangered Species Act Section 7 Consultation has been reinitiated for this fishery due to new information which reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the 1999 biological opinion.

Leatherback sea turtles (*Dermochelys coriacea*)

Leatherback turtles, a predominantly pelagic species, are widely distributed throughout the oceans of the world (including where the MSB fisheries are prosecuted), exhibiting broad thermal tolerances (Ernst and Barbour 1972, NMFS and USFWS, 1995). Adults engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS, 1992). 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, generally but not always offshore. A 1979 offshore aerial survey showed 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 prey, jellyfish. 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).

The genetic distinctness of leatherback populations is not clear. However, genetic analyses of leatherbacks 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 reduces the likelihood for one or more of these nesting populations to survive and recover in the wild would reduce the species' likelihood of survival and recovery.

Leatherbacks 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.

Leatherbacks can live greater than 30 years 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 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 include 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 State and Federal waters are known to interact with 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.

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.

The Turtle Expert Working Group (2007) provided the most recent summary of the status of total population of nesting leatherback turtles in the Atlantic Ocean. A simple summation of the 5^{th} and 95^{th} percentiles across individual subpopulations resulted in a population estimate of 34,000-90,000 adult leatherbacks in the North Atlantic Ocean. The most recent 5-year ESA leatherback sea turtle status review was completed in 2007 (NMFS & USFWS 2007) which concluded that leatherback sea turtles should remain designated as endangered.

Fishery Interactions

A single leatherback sea turtle capture has been documented on observed SMB fishing trips according to the NMFS Observer Database. The animal was caught in a bottom otter trawl net in October 2001 on a trip off the coast of New Jersey for which *Loligo* was recorded as the target species. The animal was alive when captured and was released. No information is available on the subsequent survival of the turtle. There are no mortality estimates for leatherback turtles that are attributed to the *Loligo* fishery. No leatherback turtles have been observed in the SMB fisheries since the 2001 observation described above ((based on unpublished NMFS unpublished at-sea observer data through February 2007). An estimate of total bycatch of this species is not available as the rate of interaction is low.

Loggerhead sea turtle (*Caretta caretta*)

The loggerhead sea turtle 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 leaves 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 beaches 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 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.

A 2003 report on surveys of loggerhead turtle nests in the Mexican state of Quintana Roo (Zurila et al. 2003) suggested that the number of nests has fluctuated between 903 (1987) and 2,331 (1995) and was approximately 1,897 in 2001.

The most recent 5-year ESA loggerhead sea turtle status review was completed in 2007 (NMFS & USFWS 2007) and 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. NMFS & USFWS (2007) concluded that loggerhead turtles should remain designated threatened.

Fishery Interactions

Illex Fishery

A single capture of a loggerhead turtle on an *Illex* trip was documented in 1995 according to the NMFS Observer Database. The animal was alive when captured, and was subsequently tagged. No information on the survival of this individual is available at present. There are no mortality estimates for loggerhead turtles that are attributed to the *Illex* fishery. In addition, there been no loggerhead turtles observed to be captured in the *Illex* fishery since the 1995 observation (based on unpublished NMFS unpublished at-sea observer data through February 2007).

Loligo Fishery

A loggerhead capture was observed once in each year of 1995, 1996, and 1997 on *Loligo* trips. In every case the animal was alive when captured and no injuries were reported. Five turtles (one loggerhead and four unknown) were taken by the *Loligo* fishery off New Jersey and Rhode Island during September and October 2002. In 2004, a loggerhead was resuscitated after capture on an observed *Loligo* haul, and was tagged and released alive. There have been no loggerhead turtles observed to be captured in the *Loligo* fishery since the 2004 observation (based on unpublished NMFS unpublished at-sea observer data through February 2007). An estimate of total bycatch of this species is not available (the rate of interaction is low). Based on 1996-2004 observer data, Murray 2006 estimated that 616 loggerhead turtles per year are caught in Mid-Atlantic bottom trawl gear, but did not break down bycatch rates by fishery (though of the 66 interactions used by Murray's model, 5, or 8%, came from trips targeting Loligo).

6.5 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 9 to the FMP. Publically available drafts for Amendment 10 to the FMP also contain updates through 2006 for port and community descriptions. An update for 2007 of the importance of the Atlantic mackerel, squid and butterfish to the ports and communities along the Atlantic Coast of the United States is provided immediately below, in section 6.6 of this EA. For each species, Section 6.6 describes the following: 1) stock status; 2) history of landings; 3) 2007 data for: total landings, revenues, vessels, trips, landings by state, landings by month, landings by gear, landings by port, ports most dependent on each species, numbers of permitted vessels by state, numbers of permitted dealers by state, and landings by NMFS federal permit category; 4) areas fished; 5) market overview if applicable; and 6) recreational landings if applicable.

6.6 Fishery, and Socioeconomic Description (Human Communities)

6.6.1 Atlantic mackerel

6.6.1.1 Status of the Stock

Biological reference points (BRP) for Atlantic mackerel adopted in Amendment 8 to the Atlantic Mackerel, Squid and Butterfish FMP (implemented in 1998) are Fmsy = 0.45 and SSBmsy = 890,000 mt. These reference points were re-estimated in SARC 42 to be F_{msy} = 0.16 and SSB_{msy} = 644,000 mt.

The Atlantic mackerel stock was most recently assessed at SARC 42. SARC 42 was publically available in 2006 and included data through 2004. Fishing mortality on Atlantic mackerel in 2004 was estimated to be F = 0.05 and spawning stock biomass was 2.3 million mt, leading, SARC 42 to conclude that the northwest Atlantic mackerel stock is not overfished and overfishing is not occurring. The confidence interval (± 2 SD) for F in 2004 ranged from 0.035 to 0.063. Retrospective analysis shows that F may be underestimated in recent years. The confidence interval on the 2004 SSB estimate (± 2 SD) ranged from 1.49 to 3.14 million mt. Based on retrospective analysis, SSB has sometimes been overestimated in recent years. Available trends in biomass and recruitment are shown below in Figure 4.

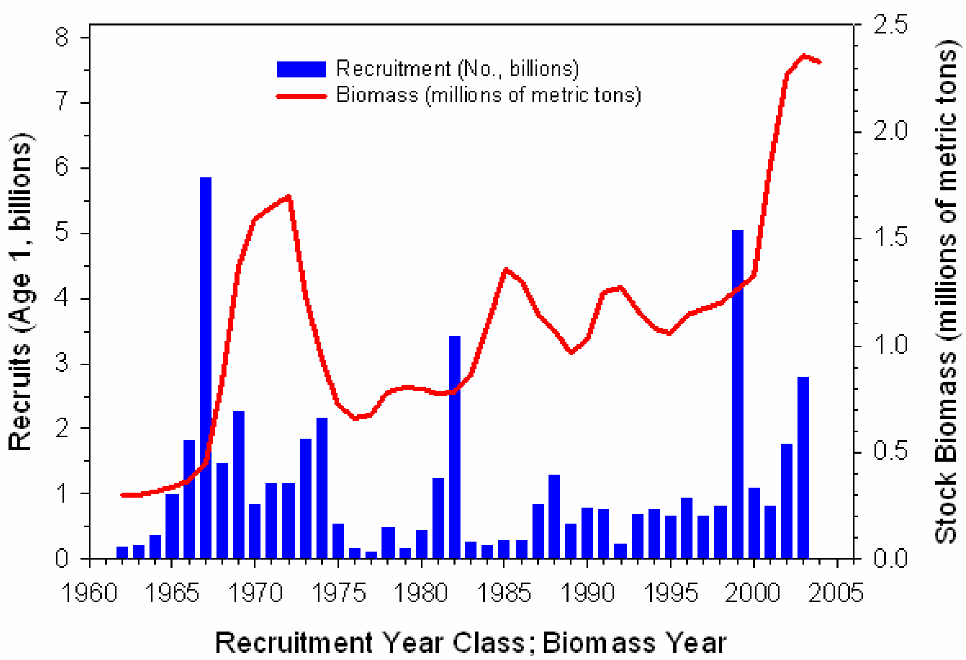

Figure 4. Mackerel biomass and recruitment.

In SARC 42, deterministic projections for 2006-2008 were conducted by assuming fishing mortality was maintained at F_{target} and assuming annual recruitment values based on the fitted S/R curve. If the F_{target} F=0.12 had been attained in 2006-2008, SSB was projected to decline to

2,043,440 mt by 2008 with associated landings of 211,990 mt. While actual landings were well below assumed landings, no updated projections are available. Since no projections were made for 2009, the Monitoring Committee used the 2008 projection as the best available proxy for 2009. These short-term projections are relatively high due to an unusually large year-class (1999) present in 2005, and it is expected that these projected landings will decline to MSY (89,000-148,000 mt) in the future when more average recruitment conditions exist in the stock. Amounts available for U.S. harvest would be even less since Ftarget=0.75 x Fmsy and since the Canadian expected catch has to be deducted. NEFSC Spring Survey indices for Atlantic Mackerel are included below in Figure 5.

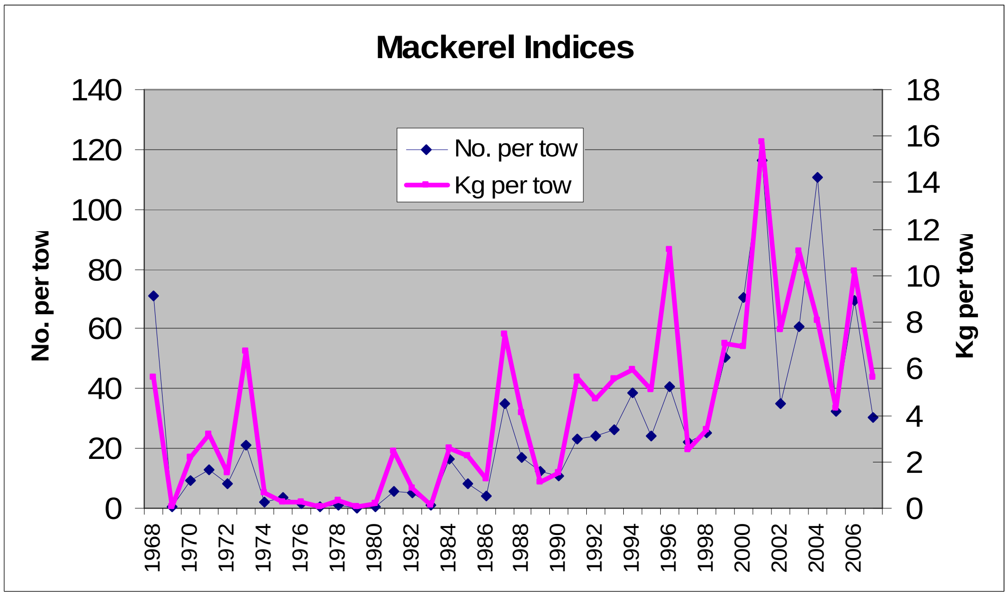

Figure 5. Spring Survey Atlantic Mackerel Indices.

6.6.1.2 Historical Commercial Fishery

The modern northwest Atlantic mackerel fishery began with the arrival of the European distant-water fleets (DWF) in the early 1960's. 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 MSB FMP 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 before being phased out again (Figure 6).

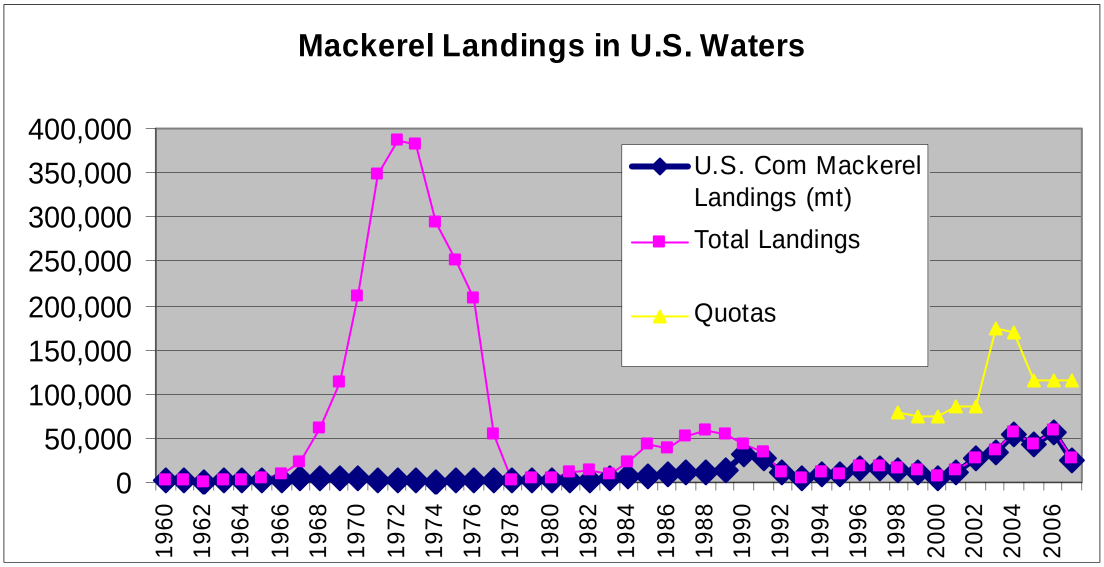

Figure 6. Atlantic mackerel landings within 200 miles of U.S. Coast, 1960-2007.

US commercial landings of mackerel increased steadily from roughly 3000 mt in the early 1980s to greater than 31,000 mt by 1990. US mackerel landings declined to relatively low levels 1992-2000 before increasing in the early 2000's. The most recent year saw a significant drop-off in harvest.

Analysis of NMFS weighout data is used to chart annual estimates for U.S. Atlantic mackerel landings (mt), ex-vessel value ($), and prices 1982-2007 ($/mt) below in figures 7, 8, and 9.

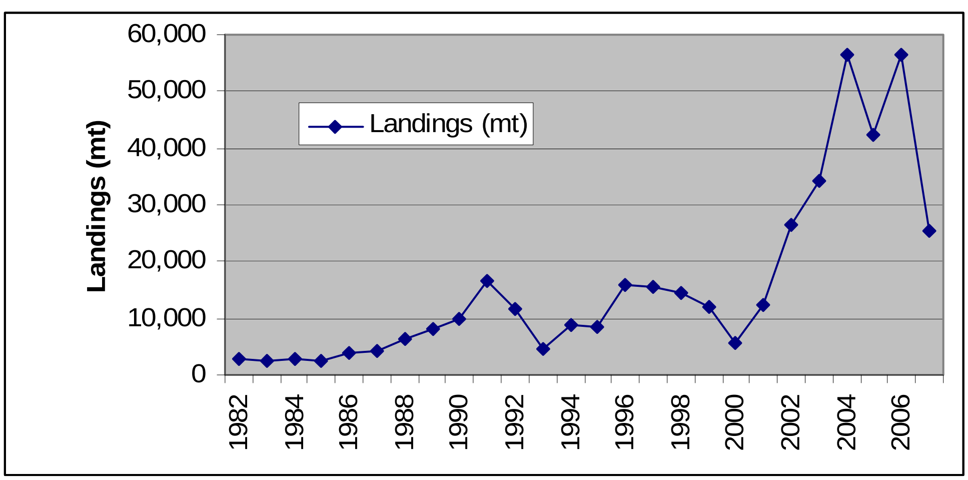

Figure 7. U.S. Atlantic mackerel landings.

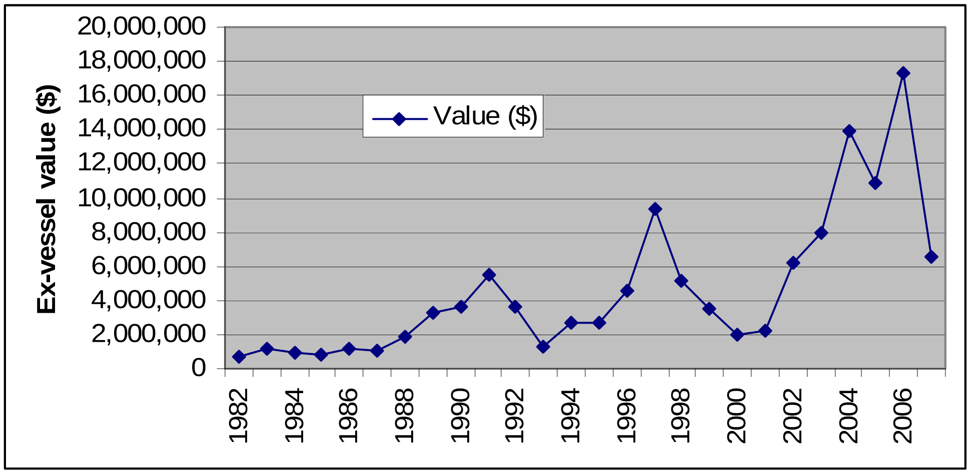

Figure 8. U.S. Atlantic mackerel ex-vessel revenues.

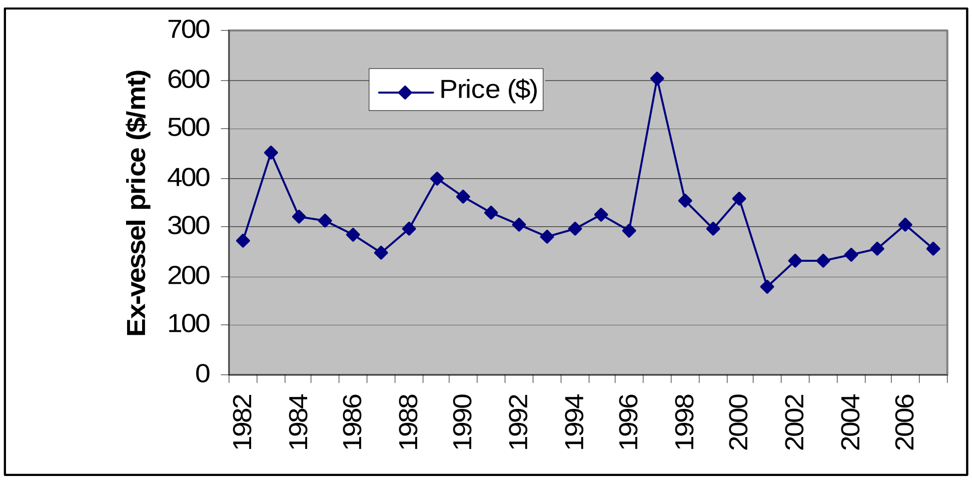

Figure 9. U.S. Atlantic mackerel ex-vessel prices.

6.6.1.3 2007 Commercial Fishery and Community Analysis

Tables 2-10 describe, for Atlantic mackerel in 2007, the total landings, value, numbers of vessels making landings, numbers of trips landing mackerel (Table 2), landings by state (Table 3), landings by month (Table 4), landings by gear (Table 5), landings by port (Table 6), ports most dependent on mackerel (Table 7), numbers of permitted and active vessels by state (Table 8), numbers of permitted and active dealers by state (Table 9), and landings by NMFS federal permit category (Table 10).

Table 2. Total landings and value of Atlantic mackerel during 2007.

(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NE Permits or Hull Numbers are considered. As such, these numbers are somewhat underestimated.)

	Landings (mt)	Value ($)	Vessels	Trips
Atlantic mackerel	25,547	6,600,095	293	1,939

Source: Unpublished NMFS dealer reports

Table 3. Atlantic mackerel landings (mt) by state in 2007.

State	Landings (mt)	Pct of Total
Massachusetts	20,974	82%
New Jersey	2,442	10%
Rhode Island	1,924	8%
Maine	116	0%
New York	62	0%
Virginia	15	0%
Connecticut	11	0%
New Hampshire	2	0%
North Carolina	0	0%
Maryland	0	0%
Total	25,547	100%

Source: Unpublished NMFS dealer reports

Table 4. Atlantic mackerel landings (mt) by month in 2007.

MONTH	Landings (mt)	Pct of Total
January	4,270	17%
February	2,049	8%
March	8,324	33%
April	9,553	37%
May	1,145	4%
June	95	0%
July	10	0%
August	2	0%
September	1	0%
October	2	0%
November	1	0%
December	94	0%
Total	25,547	100%

Source: Unpublished NMFS dealer reports

Table 5. Atlantic mackerel landings (mt) by gear category in 2007.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,MIDWATER	14,715	58%
TRAWL,OTTER,MIDWATER PAIRED	8,080	32%
TRAWL,OTTER,BOTTOM,FISH	2,097	8%
HAND LINE, OTHER	229	1%
UNKNOWN	224	1%
DREDGE, OTHER	124	0%
GILL NET,SINK, OTHER	45	0%
GILL NET,OTHER	19	0%
POUND NET, OTHER	8	0%
FLOATING TRAP	3	0%
CAST NETS	2	0%
LONGLINE, BOTTOM	1	0%
GILL NET,SET /STAKE, SEA BASS	<1	0%
DREDGE, SCALLOP,SEA	<1	0%
COMMON SEINE, HAUL SEINE	<1	0%
TROLL LINE, OTHER	<1	0%
POT/TRAP, LOBSTER OFFSH NK	<1	0%
POTS + TRAPS,OTHER	<1	0%
TRAWL,OTTER,BOTTOM,OTHER	<1	0%
PURSE SEINE, OTHER	<1	0%
Total	25547	100%

Source: Unpublished NMFS dealer reports

Table 6. Atlantic mackerel landings by port in 2007.

Port Name	State	Landings (mt)	Pct of Total
NEW BEDFORD	MASSACHUSETTS	9,694	38%
GLOUCESTER	MASSACHUSETTS	8,945	35%
CAPE MAY	NEW JERSEY	2,417	9%
FALL RIVER	MASSACHUSETTS	2,332	9%
NORTH KINGSTOWN	RHODE ISLAND	1,625	6%
POINT JUDITH	RHODE ISLAND	228	1%
All others		306	1%
	Total	25,547	100%

Source: unpublished NMFS dealer reports.

Table 7. Value of Atlantic mackerel landings by port compared to total value of all species landed by port in 2007 where mackerel comprised >= 1% of total value.

Port Name	State	Vessels	Value of All Species	Value of Mackerel	Pct of Port's Revenue from Mackerel
FALL RIVER	MA	6	5,056,252	779,100	15%
CAPE ELIZABETH	ME	CI	CI (less than 1 mil)	CI	13%
NORTH KINGSTOWN	RI	5	10,303,954	992,537	10%
GLOUCESTER	MA	45	46,830,657	2,007,841	4%
CAPE MAY	NJ	9	52,888,290	638,245	1%

Note: CI = Confidential Information or potentially Confidential Information
Source: unpublished NMFS dealer reports.

Table 8. Atlantic mackerel vessel permit holders and active permit holders in 2007 by homeport state (HPST).

HPST	Permitted Vessels	Active Vessels
MA	966	69
NJ	321	30
ME	304	5
NY	234	31
RI	167	48
NC	121	3
NH	114	10
VA	93	.
CT	47	1
MD	34	4
FL	19	.
DE	16	1
PA	11	.
GA	7	.
SC	2	.
AL	1	.
MS	1	.
NE	1	1
TX	1	.
WA	1	.
WV	1	1

Source: unpublished NMFS permit and dealer data.
(Note: Table 8 numbers are less than Table 2 numbers because Table 8 only includes vessels with federal permits)

Table 9. Atlantic mackerel, squid, and butterfish dealer permit holders and those that made Atlantic mackerel purchases in 2007 by state.

ST	Permitted Dealers	Active Dealers
MA	161	23
NY	108	23
RI	46	15
ME	33	6
NC	35	5
NJ	71	5
VA	31	3
MD	15	2
NH	13	1
AL	1	.
CA	1	.
CT	10	.
DE	6	.
FL	7	.
GA	1	.
HI	1	.
LA	3	.
NS	1	.
PA	4	.
SC	1	.
VI	1	.

Source: unpublished NMFS permit and dealer reports.

Table 10. Atlantic mackerel landings by permit category for the period 1998-2007.

Year	Atlantic Mackerel Permit		Party/Charter		No Permit/ Unknown		**Total**	
	mt	%	mt	%	mt	%	mt	Quota
1998	12,022	83%	3	0%	2,500	17%	14,525	80,000
1999	11,378	95%	4	0%	649	5%	12,031	75,000
2000	5,333	94%	10	0%	306	5%	5,649	75,000
2001	12,063	98%	0	0%	277	2%	12,340	85,000
2002	25,887	98%	0	0%	643	2%	26,530	85,000
2003	33,969	99%	0	0%	329	1%	34,298	175,000
2004	56,097	99%	0	0%	342	1%	56,439	170,000
2005	38,710	92%	0	0%	3,499	8%	42,209	115,000
2006	55,945	99%	0	0%	696	1%	56,641	115,000
2007	24,446	96%	0	0%	1,101	4%	25,547	115,000

6.6.1.4 Description of areas fished

Atlantic mackerel landings in 2007 by NMFS three digit statistical area (see Figure 10) are given in Table 11. Statistical areas 537, 613, and 526 accounted for the majority of the commercial Atlantic mackerel landings in 2007.

Table 11. Statistical areas from which 1% or more of Atlantic mackerel were landed in 2007.

Stat Area	Landings (mt)	Percentage from area
537	9,823	34%
613	6,621	23%
526	6,422	22%
615	2,046	7%
612	1,192	4%
616	1,179	4%
521	492	2%
539	307	1%
513	297	1%
525	232	1%
611	218	1%
622	157	1%

Source: Unpublished NMFS VTR reports.

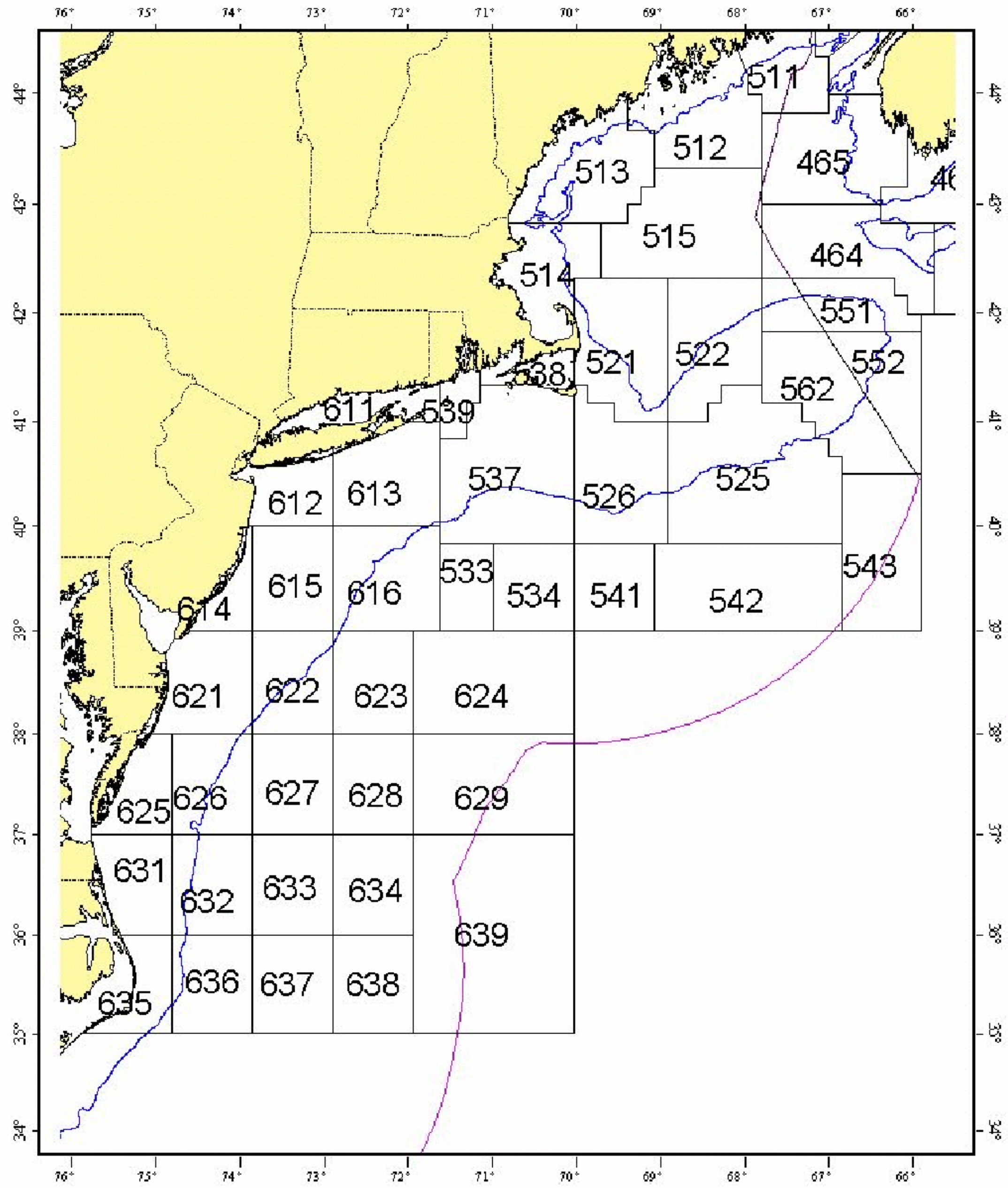

Figure 10. NMFS Statistical Areas

6.6.1.5 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.

6.6.1.5.1 World Production and Prices

According to the FAO, world landings of Atlantic mackerel dramatically increased in the 1960s, peaked at 1,092,759 mt in 1975, and have been between 550,000 mt and 850,000 mt since 1977. 2005 and 2006 landings, the most recent available, were about 560,000 mt, which since 1966 would be considered low but not unprecedented (Figure 11) (http://www.fao.org/fishery/statistics/programme/3,1,1). Prices for exported U.S. mackerel, likely a good indication of prices on the world market, averaged $1,041.57 per mt in 2006 and $1,119.53 per mt in 2007 (*Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division*).

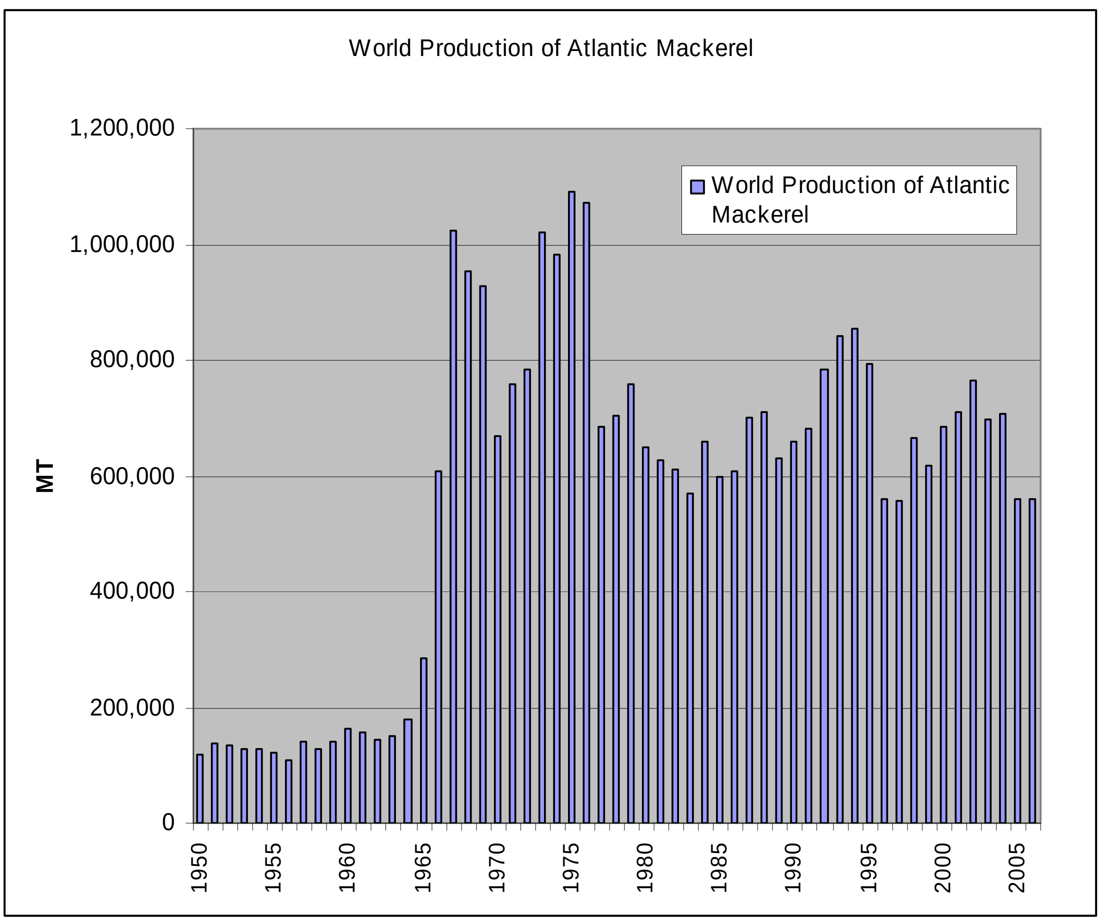

Figure 11. World production of Atlantic mackerel, 1950-2006 based on FAO (2008).

6.6.1.5.2 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 fallen off in 2006 and 2007, resulting in increased demand for mackerel imports (Chetrick 2006: http://www.fas.usda.gov/info/fasworldwide/2006/10-2006/EUMackerel.pdf). It appears that demand for US mackerel will likely continue to remain high even if US production increases to a level approaching MSY since US production appears to be supplanting European production in the world marketplace.

6.6.1.5.3 US Production and Exports of Mackerel

The lack of mackerel in the North Sea area during the 1990's and the potential for future mackerel TAC reductions provided opportunities for US producers to place additional exports of mackerel in the international market. Higher mackerel prices in the international market also provided incentive for the US Atlantic mackerel industry to sell large volumes of this product (Ross 1996). In 2006, US exports of all mackerel products totaled 55,858 mt valued at $58.2 million. The leading markets for US exports of mackerel in 2006 were Egypt (9,109 mt), Nigeria (8,972 mt), Equatorial Guinea (5,818 mt), Portugal (5,059 mt), Romania (2,976 mt) Bulgaria(2,386 mt) and Turkey (2,212 mt). In 2007, US exports of all mackerel products totaled 30,380 mt valued at $34.0 million. The leading markets for US exports of mackerel in 2007 were Egypt (8,816 mt), Japan (3,960), China (3,339), Canada (1,789), and Bulgaria (1,738) (*Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division.*).

6.6.1.6 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 1998, as estimated from the NMFS Marine Recreational Fishery Statistics Survey, are given in Table 12. In recent years, recreational mackerel landings have varied from roughly 1,633 mt in 1997 to 689 mt in 1998. The highest landings occur from New Jersey to Massachusetts. Most Atlantic mackerel are taken from boats (Table 13).

Table 12. Recreational landings (rounded to nearest metric ton) of Atlantic mackerel by state, 1998-2007.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Annual Totals
1,998	149	90	352	8	0	7	70	3	6	5	0	689
1,999	258	156	624	45	0	15	214	0	17	5	0	1,335
2,000	364	166	857	2	0	10	31	0	1	15	0	1,448
2,001	287	224	885	7	0	18	78	13	22	2	0	1,536
2,002	387	65	728	47	1	0	60	3	2	0	0	1,294
2,003	123	79	510	8	0	19	29	0	0	1	0	770
2,004	207	27	291	0	0	0	2	3	0	0	0	530
2,005	181	74	768	0	0	0	10	0	0	0	0	1,033
2,006	109	31	1,488	1	3	0	0	0	0	0	0	1,633
2,007	278	43	561	0	0	0	0	0	0	0	0	882

Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division.

Table 13. Recreational landings (rounded to nearest metric ton) of Atlantic mackerel by mode, 1998-2007.

Year	SHORE	PARTY/ CHARTER	PRIVATE/ RENTAL	Annual Totals
1998	66	109	514	689
1999	87	293	955	1,335
2000	127	81	1,239	1,448
2001	82	164	1,290	1,536
2002	98	23	1,172	1,294
2003	123	53	594	770
2004	115	21	395	530
2005	14	25	994	1,033
2006	62	11	1,560	1,633
2007	63	20	799	882

Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division.

6.6.2 *Illex illecebrosus*

6.6.2.1 Status of the Stock

The overfishing definition for *Illex* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of FMSY is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of FMSY. Maximum OY will be specified as the catch associated with a fishing mortality rate of FMSY. In addition, the biomass target is specified to equal BMSY. The minimum biomass threshold is specified as ½ BMSY.

The *Illex* stock was most recently assessed at SARC 42. SARC 42 was publically available in 2006 and included data through 2004. It was not possible to evaluate current stock status because there are no reliable current estimates of stock biomass or fishing mortality rate. In addition, no projections were made in SAW 42. SAW 37 (the previous assessment) also could not 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, it was determined that overfishing was not likely to have occurred during 1999-2002. NEFSC indices for Fall surveys are included below in Figure 12.

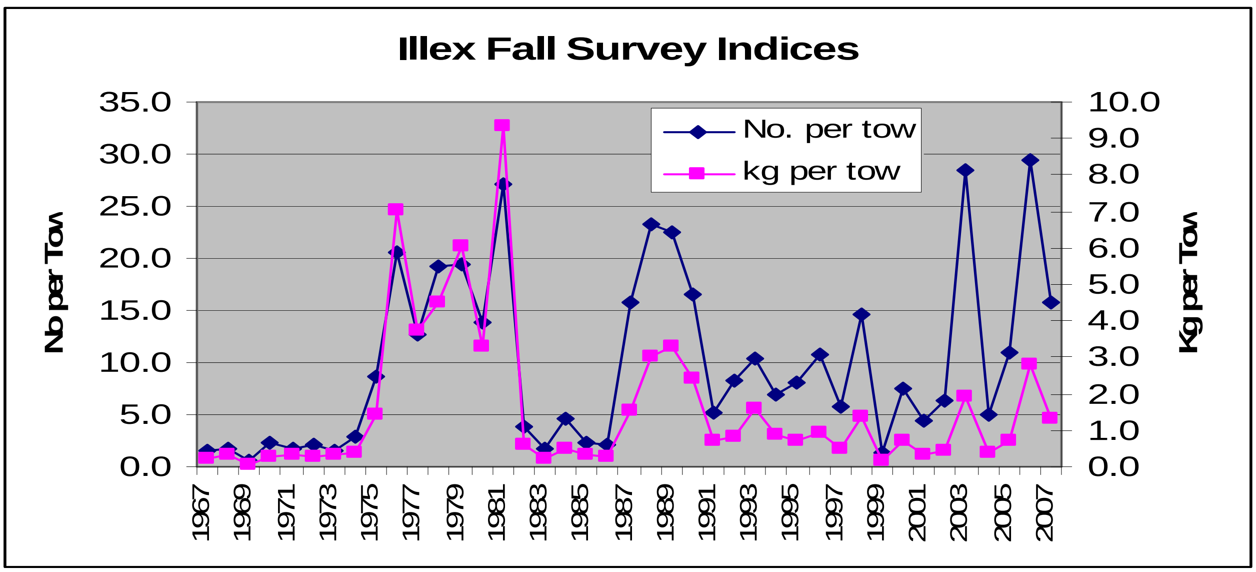

Figure 12. Illex Indices from NEFSC Fall survey.

6.6.2.2 Historical Commercial Fishery

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 (Figure 13). 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 fitfully during the 1980's as foreign fishing was eliminated in the US EEZ. *Illex* landings are heavily influenced by year-to-year availability and world-market activity.

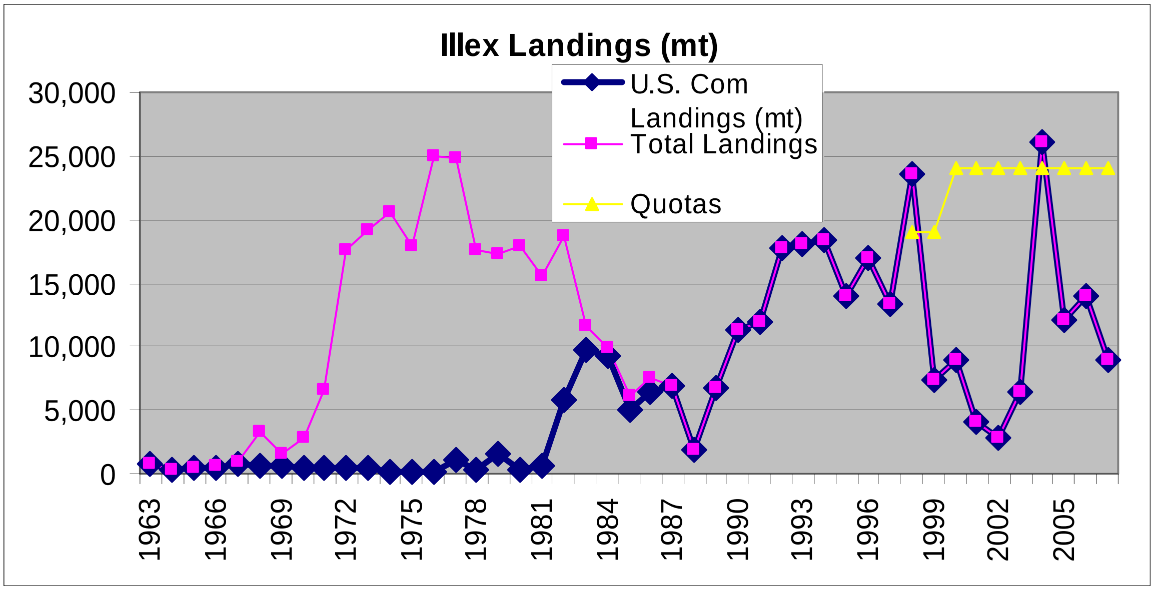

Figure 13. Landings of Illex in the U.S. EEZ, 1963-2007.

Analysis of NMFS dealer weighout data 1982-2007 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) below in figures 14, 15, and 16.

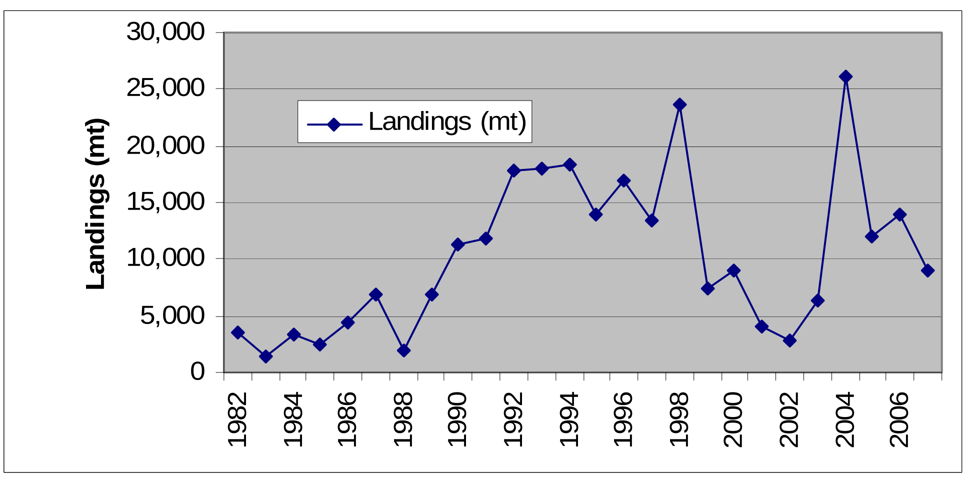

Figure 14. U.S. Illex landings.

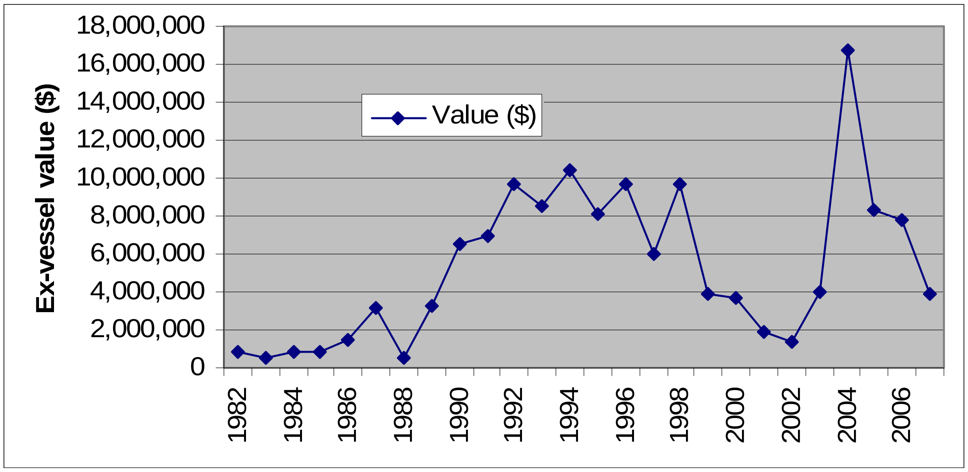

Figure 15. U.S. Illex ex-vessel revenues.

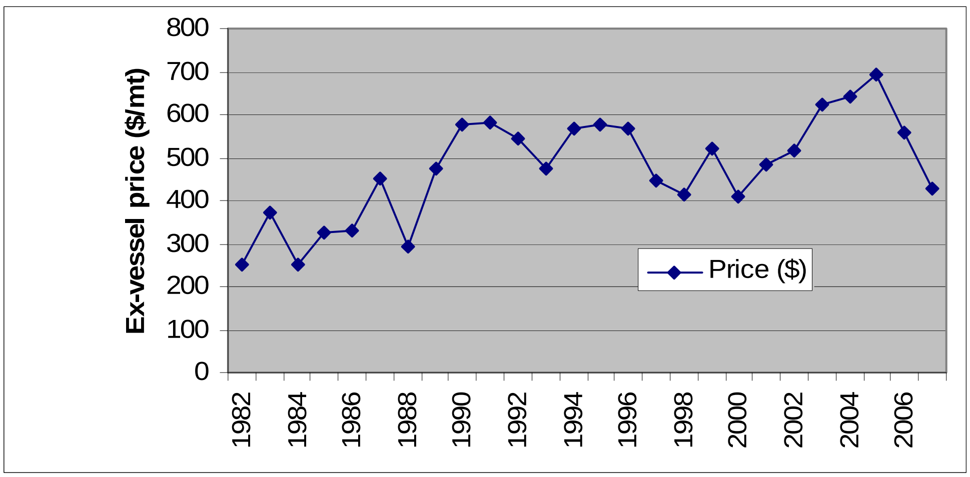

Figure 16. U.S. Illex ex-vessel prices.

Source: Unpublished NMFS Dealer Data

6.6.2.3 2007 Commercial Fishery and Community Analysis

The following tables (14-22) describe, for *Illex* in 2007, the total landings, value, numbers of vessels making landings, numbers of trips landing *Illex* (Table 14), landings by state (Table 15), landings by month (Table 16), landings by gear (Table 17), landings by port (Table 18), ports most dependent on *Illex* (Table 19), numbers of permitted and active vessels by state (Table 20), numbers of permitted and active dealers by state (Table 21), and landings by NMFS federal permit category (Table 22).

Table 14. Total landings and value of *Illex* during 2007.
(based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NE Permits or Hull Numbers are considered. As such, these numbers are somewhat underestimated.)

	Landings (mt)	Value ($)	Vessels	Trips
Illex	9,022	3,863,008	32	145

Source: Unpublished NMFS dealer reports

Table 15. *Illex* landings (mt) by state in 2007.

State	Landings (mt)	Pct of Total
New Jersey	5,313	59%
Rhode Island	3,558	39%
North Carolina	113	1%
Virginia	34	0%
New York	2	0%
Connecticut	1	0%
Massachusetts	0	0%
Totals	9,022	100%

Source: Unpublished NMFS dealer reports

Table 16. *Illex* squid landings (mt) by month in 2007.

MONTH	Landings (mt)	Pct of Total
January	3	0%
February	0	0%
March	17	0%
April	5	0%
May	1	0%
June	210	2%
July	855	9%
August	2,443	27%
September	4,407	49%
October	1,073	12%
November	1	0%
December	7	0%
Totals	9,022	100%

Source: Unpublished NMFS dealer reports

Table 17. *Illex* landings (mt) by gear category in 2007.

GEAR NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	7,948	88%
HAND LINE, OTHER	686	8%
DREDGE, OTHER	241	3%
TRAWL,OTTER,BOTTOM,OTHER	113	1%
TRAWL,OTTER,MIDWATER	34	0%
DIP NET, COMMON	1	0%
UNKNOWN	<1	0%
POUND NET, OTHER	<1	0%
TROLL LINE, OTHER	<1	0%
DIVING GEAR	<1	0%
Total	9,022	100%

Source: Unpublished NMFS vessel trip reports

Table 18. *Illex* landings by port in 2007.

Port Name	State	Landings (mt)	Pct of Total
CAPE MAY	NEW JERSEY	5112	57%
NORTH KINGSTOWN	RHODE ISLAND	3558	39%
OTHER CAPE MAY	NEW JERSEY	202	2%
WANCHESE	NORTH CAROLINA	113	1%
All others		38	0%
	Total	9,022	100%

Source: Unpublished NMFS dealer reports.

Table 19. Value of *Illex* landings by port compared to total value of all species landed by port in 2007 where *Illex* comprised >= 1% of total value

NAME	State	Vessels	Value of All Species	Value of Illex	Pct of Port's Revenue from Illex
NORTH KINGSTOWN	RI	3	10,303,954	1,911,904	19%
OTHER CAPE MAY	NJ	CI	CI (less than 2 mil)	CI	6%
CAPE MAY	NJ	9	52,888,290	1,793,194	3%

Source: Unpublished NMFS dealer reports.

Table 20. ***Illex*** **moratorium vessel permit holders and active vessels in 2007 by homeport state (HPST).**

HPST	Permitted Vessels (Mor.)	Active Permitted Vessels (Mor.)
NJ	27	4
MA	14	2
RI	12	4
NC	7	2
NY	7	2
VA	5	.
PA	3	1
CT	2	.
NH	1	.
Total	78	

Source: Unpublished NMFS dealer reports.
(Note: Table 20 numbers are less than Table 14 numbers because Table 20 only includes vessels with federal moratorium permits)

Table 21. Atlantic mackerel, squid, butterfish dealer permit holders and permitted dealers who bought *Illex* in 2007 by state.

ST	Permitted Dealers	Active Permitted Dealers
NY	108	6
NC	35	4
MA	161	2
RI	46	2
NJ	71	1
VA	31	1
AL	1	.
CA	1	.
CT	10	.
DE	6	.
FL	7	.
GA	1	.
HI	1	.
LA	3	.
MD	15	.
ME	33	.
NH	13	.
NS	1	.
PA	4	.
SC	1	.
VI	1	.

Source: Unpublished NMFS dealer reports.

Table 22. Illex landings by permit category for the period 1998-2007.

Year	Illex Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	Mt	%	mt	%	mt	%	mt	Quota
1998	23,520	100%	0	0%	6	0%	42	0%	23,568	19,000
1999	7,367	100%	0	0%	13	0%	8	0%	7,389	19,000
2000	8,234	99%	0	0%	1	0%	77	1%	8,312	24,000
2001	3,922	98%	0	0%	0	0%	86	2%	4,009	24,000
2002	2,743	100%	0	0%	2	0%	5	0%	2,750	24,000
2003	6,389	100%	0	0%	0	0%	2	0%	6,391	24,000
2004	25,008	98%	0	0%	139	1%	274	1%	25,422	24,000
2005	11,279	96%	0	0%	23	0%	415	4%	11,717	24,000
2006	13,778	100%	0	0%	52	0%	7	0%	13,837	24,000
2007	9,019	100%	0	0%	1	0%	2	0%	9,022	24,000

6.6.2.4 Description of the areas fished

The 2007 landings of *Illex* by statistical area (see Figure 10) are given in Table 23 (includes only the three digit statistical areas that individually accounted for greater than 1% of the *Illex* landings in 2007). Statistical areas 622, 626, and 632 accounted for roughly 95% of *Illex* landings in 2007.

Table 23. Statistical areas from which 1% or more of Illex were landed in 2007.

Stat Area	Landings (mt)	Percentage from area
622	5,630	75%
626	967	13%
632	492	7%
627	83	1%
614	82	1%
621	79	1%
616	66	1%
615	39	1%

Source: Unpublished NMFS VTR reports.

6.6.3 Atlantic butterfish

6.6.3.1 Status of the stock

The overfishing definition for Butterfish was revised in Amendment 8 to comply with the SFA as follows: overfishing for butterfish will be defined to occur when the catch associated with a threshold fishing mortality rate of FMSY is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of FMSY. Maximum OY will be specified as the catch associated with a fishing mortality rate of FMSY. In addition, the biomass target is specified to equal BMSY. The minimum biomass threshold is specified as ½ BMSY.

The butterfish stock was most recently assessed at SARC 38. SARC 38 was publically available in 2004 and included data through 2002. SARC 38 determined that butterfish was overfished in 2002 (NEFSC 2004). Although the assessment stock size estimates are highly imprecise (80% confidence interval ranged from 2,600 mt to 10,900 mt), the overfished determination was based on the fact that the 2002 biomass estimate for butterfish of 7,800 mt fell below the threshold level defining the stock as overfished (1/2 Bmsy=11,400 mt). Based on the current overfishing definition, overfishing was not occurring (NMFS 2004). Trends in recruitment and biomass are shown below in Figure 17.

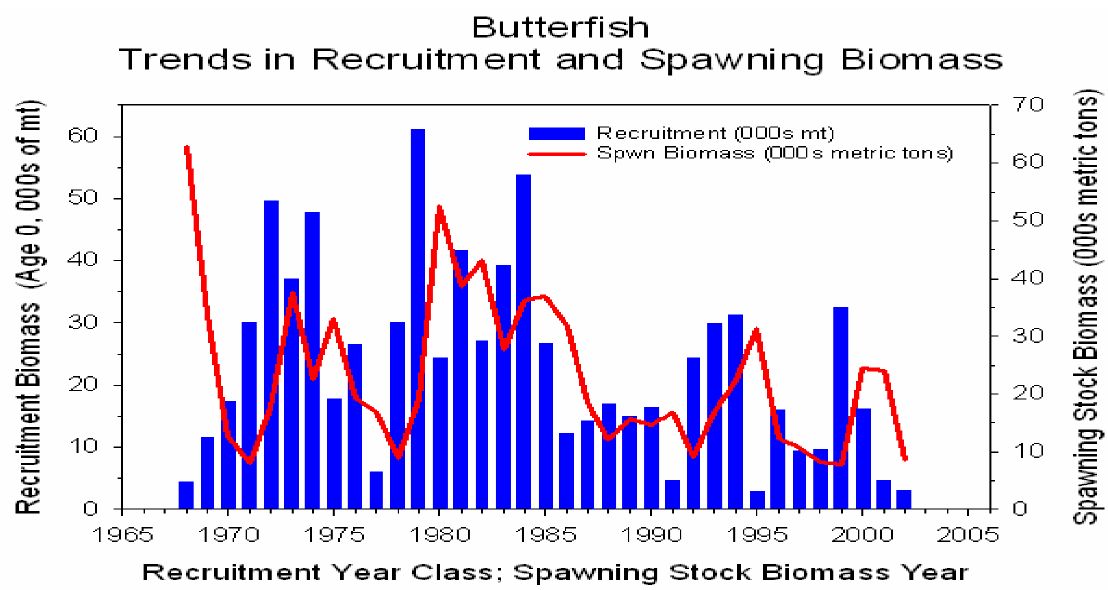

Figure 17. Butterfish recruitment and biomass.

Butterfish discards are estimated to equal twice the annual landings (NEFSC 2004). Analyses have shown that the primary source of butterfish discards is the *Loligo* fishery because it uses small-mesh, diamond-mesh codends (as small as 1 $^{7/8}$ inches minimum mesh size) and because butterfish and *Loligo* co-occur year round. The truncated age distribution of the butterfish stock is also problematic. Historically, the stock was characterized by a broader age distribution and the maximum age was six years. The lifespan is now three years (NEFSC 2004). The truncated age structure results in reduced egg production and the reduced lifespan artificially reduces the mean generation time required to rebuild the stock. Because of the overfished determination, current federal law obligates the Council to develop and implement a stock rebuilding plan.

There is no peer reviewed information available on butterfish abundance in 2008. Recent, unpublished NEFSC survey indices suggest that butterfish relative abundance may have increased somewhat in 2006 and 2007. However, while the NEFSC 2007 and 2008 spring survey indices for butterfish were relatively high (Figure 19), the 2007 NEFSC fall survey indices were the lowest on record (Figure 18). It should also be noted that, historically, the spring and fall survey indices have not tracked each other. Regardless, the 2004 SAW/SARC report is the authoritative reference for stock status and current federal law obligates the Council to develop and implement a stock rebuilding plan until a peer reviewed butterfish stock assessment determines the stock is rebuilt to the B_{msy} level (the next butterfish assessment is scheduled for 2010).

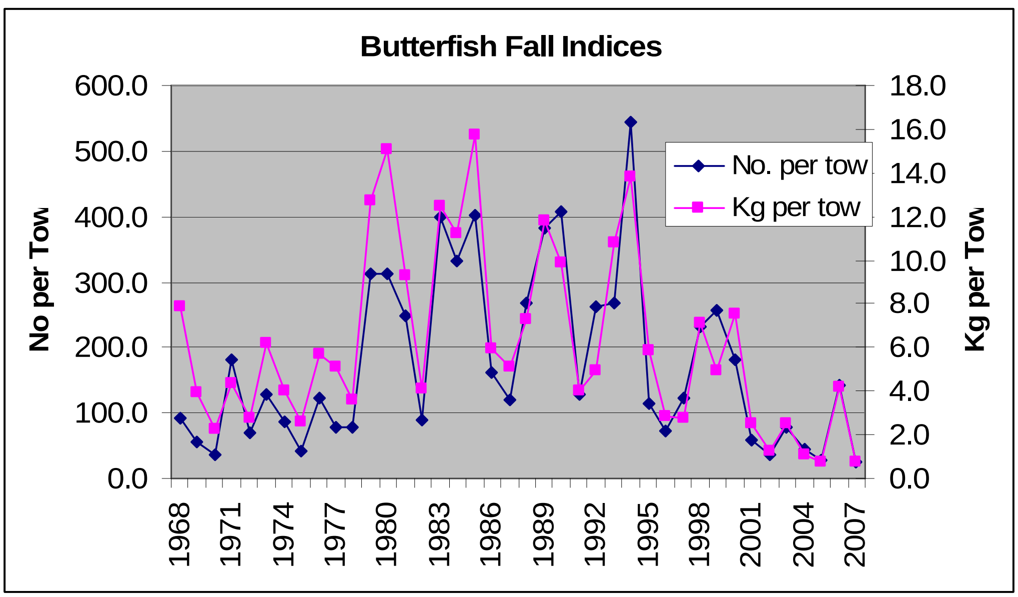

Figure 18. NEFSC fall trawl survey indices for butterfish, 1968-2007

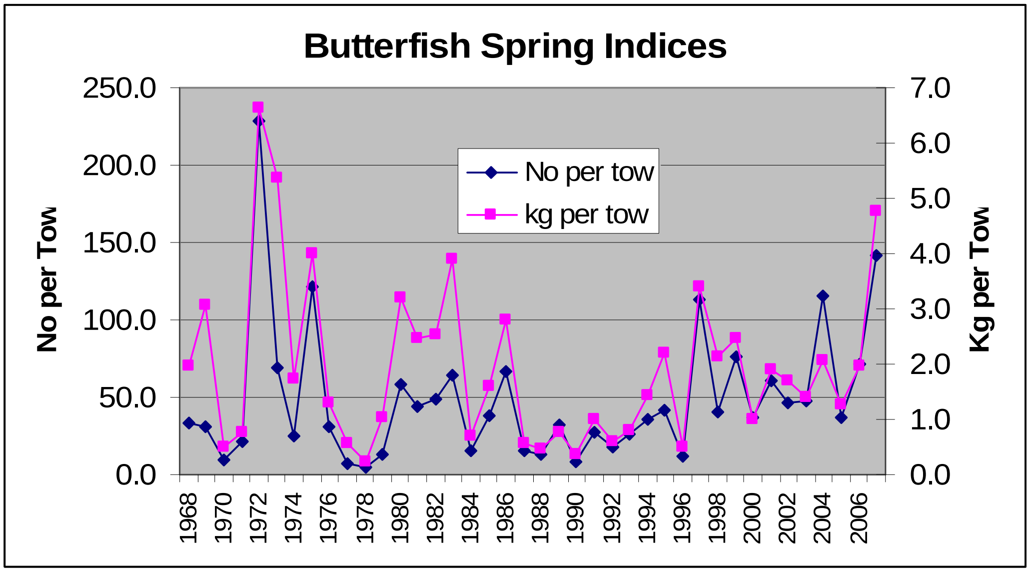

Figure 19. NEFSC spring trawl survey indices for butterfish, 1968-2007

6.6.3.2 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 catches declined sharply from 10,353 mt in 1976 to 1,326 mt in 1978 (Figure 20). Foreign landings were completely phased out by 1987.

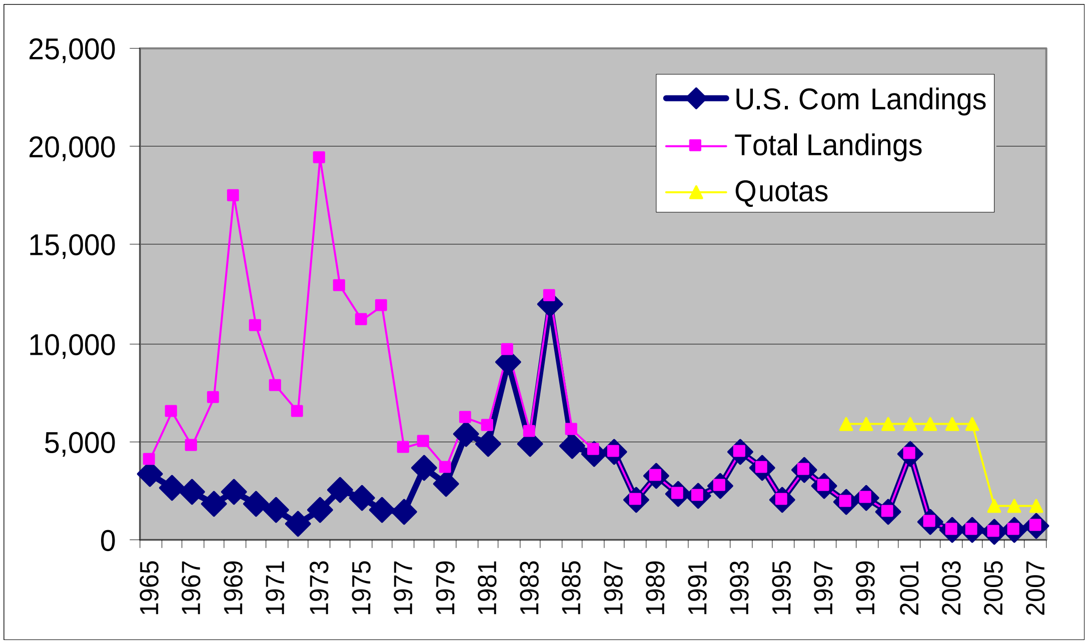

Figure 20. Landings of butterfish in the United States exclusive economic zone.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, with a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply. Low abundance and reductions in Japanese demand for butterfish has probably had a negative effect on butterfish landings (however prices are relatively high). Analysis of NMFS weighout data 1982-2007 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) below in figures 21, 22, and 23.

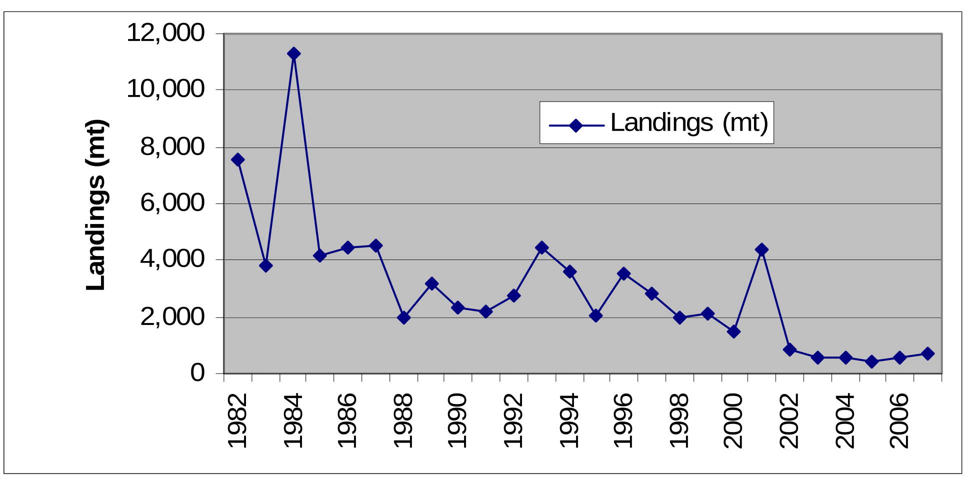

Figure 21. U.S. butterfish landings.

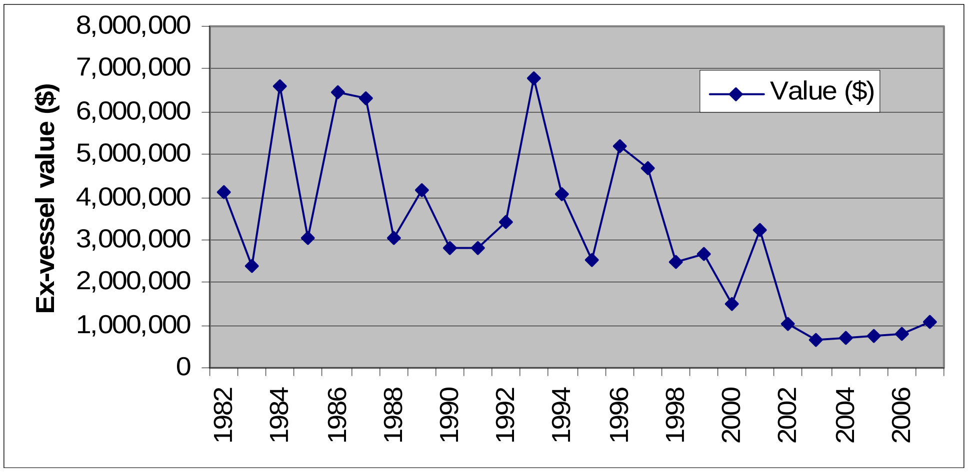

Figure 22. U.S. butterfish ex-vessel revenues.

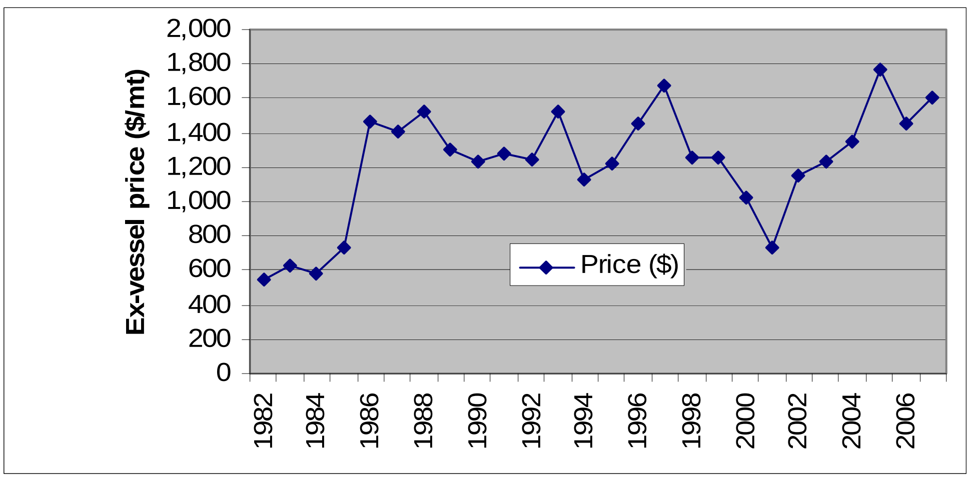

Figure 23. U.S. butterfish ex-vessel prices.

6.6.3.3 2007 Commercial Fishery and Community Analysis

The following tables (24-32) describe, for butterfish in 2007, the total landings, value, numbers of vessels making landings, numbers of trips landing butterfish (Table 24), landings by state (Table 25), landings by month (Table 26), landings by gear (Table 27), landings by port (Table 28), ports most dependent on butterfish (Table 29), numbers of permitted vessels by state (Table 30), numbers of permitted dealers by state (Table 31), and landings by NMFS federal permit category (Table 32).

Table 24. Total landings and value of butterfish during 2007.
(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NE Permits or Hull Numbers are considered. As such, these numbers are somewhat underestimated.)

	Landings (mt)	Value ($)	Vessels	Trips
Butterfish	673	1,078,168	309	5,783

Source: Unpublished NMFS dealer reports

Table 25. Butterfish landings (mt) by state in 2007.

State	Landings (mt)	Pct of Total
Rhode Island	352	52%
New York	164	24%
New Jersey	80	12%
Virginia	25	4%
Connecticut	18	3%
Massachusetts	17	2%
Maryland	15	2%
New Hampshire	1	0%
Delaware	0	0%
North Carolina	0	0%
Total	673	100%

Source: Unpublished NMFS dealer reports.

Table 26. Butterfish landings (mt) by month in 2007.

MONTH	Landings (mt)	Pct of Total
January	84	12%
February	35	5%
March	83	12%
April	81	12%
May	53	8%
June	74	11%
July	23	3%
August	18	3%
September	56	8%
October	100	15%
November	44	7%
December	22	3%
Total	673	100%

Source: Unpublished NMFS dealer reports.

Table 27. Butterfish landings (mt) by gear category in 2007.

GEAR NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	491	73%
UNKNOWN	102	15%
DREDGE, OTHER	34	5%
POUND NET, OTHER	15	2%
HAND LINE, OTHER	8	1%
POUND NET, FISH	7	1%
GILL NET,SINK, OTHER	5	1%
TRAWL,OTTER,MIDWATER	3	0%
POTS + TRAPS,OTHER	2	0%
POT/TRAP, LOBSTER OFFSH	2	0%
LONGLINE, BOTTOM	1	0%
DIP NET, COMMON	1	0%
CAST NETS	1	0%
FLOATING TRAP	1	0%
OTHER	2	0%
Totals	673	100%

Source: Unpublished NMFS dealer data.

Table 28. Butterfish landings by port in 2007.

Port Name	State	Landings (mt)	Pct of Total
POINT JUDITH	RHODE ISLAND	207	31%
NORTH KINGSTOWN	RHODE ISLAND	120	18%
MONTAUK	NEW YORK	100	15%
CAPE MAY	NEW JERSEY	54	8%
HAMPTON BAYS	NEW YORK	22	3%
NEWPORT	RHODE ISLAND	20	3%
BELFORD	NEW JERSEY	19	3%
POINT LOOKOUT	NEW YORK	16	2%
OCEAN CITY	MARYLAND	14	2%
STONINGTON	CONNECTICUT	11	2%
AMAGANSETT	NEW YORK	10	1%
HAMPTON	VIRGINIA	9	1%
NEW BEDFORD	MASSACHUSETTS	8	1%
GREENPORT	NEW YORK	7	1%
CHINCOTEAGUE	VIRGINIA	7	1%
NEW LONDON	CONNECTICUT	7	1%
LITTLE WICOMICO RIVER	VIRGINIA	7	1%
POINT PLEASANT	NEW JERSEY	4	1%
BOSTON	MASSACHUSETTS	4	1%
LITTLE COMPTON	RHODE ISLAND	4	1%
All others		21	3%
	Total	673	100%

Source: Unpublished NMFS dealer reports

Table 29. Value of butterfish landings by port compared to total value of all species landed by port in 2007 where butterfish comprised >1% of total value.

Port Name	State	Vessels	Value of All Species	Value of butterfish	Percent of total value from butterfish
AMMAGANSETT	NY	CI	CI	CI	4%
LITTLE WICOMICO RIVER	VA	CI	CI	CI	3%
GREENPORT	NY	5	488,953	14,269	3%
POINT LOOKOUT	NY	6	1,856,535	44,661	2%
WAINSCOTT	NY	CI	CI	CI	2%
NORTH KINGSTOWN	RI	5	10,303,954	130,643	1%
MONTAUK	NY	27	17,739,034	211,821	1%
BELFORD	NJ	12	3,148,661	33,712	1%

Source: Unpublished NMFS dealer reports and NMFS permit database data

Table 30. Loligo/Butterfish moratorium vessel permit holders in 2007 by homeport state (HPST) and how many of those vessels were active.

HPST	Vessels with Moratorium Permits	Vessels with Moratorium Permits that landed butterfish
MA	107	21
NJ	85	42
RI	64	51
NY	60	43
NC	22	6
ME	17	.
VA	12	.
CT	8	3
PA	4	.
MD	2	1
NH	1	.
WV	1	1

Source: Unpublished NMFS dealer reports and NMFS permit database data
(Note: Table 30 numbers are less than Table 24 numbers because Table 30 only includes vessels with federal moratorium permits)

Table 31. Atlantic mackerel, squid, butterfish dealer permit holders and how many were active (bought butterfish) in 2007 by state.

ST	Permitted Dealers	Active Dealers
NY	108	36
RI	46	17
MA	161	9
NJ	71	8
VA	31	7
MD	15	2
CT	10	1
DE	6	1
NH	13	1
AL	1	.
CA	1	.
FL	7	.
GA	1	.
HI	1	.
LA	3	.
ME	33	.
NC	35	.
NS	1	.
PA	4	.
SC	1	.
VI	1	.

Source: Unpublished NMFS dealer reports and NMFS permit database data

Table 32. Butterfish landings by permit category for the period 1998-2007.

Year	Loligo/Butterfish Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	Mt	%	mt	%	mt	%	mt	Quota
1998	1,711	87%	0	0%	34	2%	221	11%	1,966	5,900
1999	1,868	89%	0	0%	33	2%	209	10%	2,110	5,900
2000	1,175	81%	0	0%	60	4%	214	15%	1,449	5,900
2001	3,991	91%	1	0%	52	1%	360	8%	4,404	5,897
2002	653	75%	0	0%	39	4%	180	21%	872	5,900
2003	367	69%	0	0%	17	3%	151	28%	536	5,900
2004	323	61%	0	0%	21	4%	190	36%	534	5,900
2005	271	62%	0	0%	13	3%	154	35%	437	1,681
2006	377	68%	0	0%	36	7%	141	25%	554	1,681
2007	524	78%	0	0%	42	6%	107	16%	673	1,681

6.6.3.5 Description of the areas fished

The 2007 landings of butterfish by NMFS three-digit statistical area (see Figure 10) are given in Table 33. Statistical areas 537, 616, and 611 accounted for the majority of the butterfish catch.

Table 33. Statistical areas from which 1% or more of butterfish were landed in 2007 based on unpublished NMFS dealer reports

Stat Area	Landings (mt)	Percentage from area
537	148	25%
616	92	15%
611	71	12%
621	59	10%
539	49	8%
613	39	6%
612	21	3%
525	18	3%
562	16	3%
636	15	2%
635	12	2%
526	12	2%
625	8	1%
127	6	1%
148	4	1%
149	3	1%

Source: Unpublished NMFS dealer reports

6.6.4 *Loligo pealei*

6.6.4.1 Status of the stock

The *Loligo* stock was most recently assessed at SARC 34. SARC 34 was publically available in 2002 and included data through 2000. 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. 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 term has fluctuated without trend.

Amendment 9 implemented revised proxies for calculating fishing mortality thresholds and targets as recommended by SARC 34. The revised proxies are calculated as follows: FTarget is the 75th percentile of fishing mortality rates during 1987 - 2000 and FThreshold is the average fishing mortality rates during the same period. The revised proxy for FTarget (0.32 or 0.24 for trimesters and quarters, respectively) will be used as the basis for establishing *Loligo* OY. The revised proxies for FTarget and FThreshold proposed in this rule are fixed values based on average fishing mortality rates achieved during a time period when the stock biomass was fairly resilient (1987 - 2000). In addition, the biomass target is specified to equal B_{MSY}.

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 a catch not to exceed about 20,000 mt (to include both landings and discards). 2007 indices were lower than 2006 but still above the long term average (Figure 24).

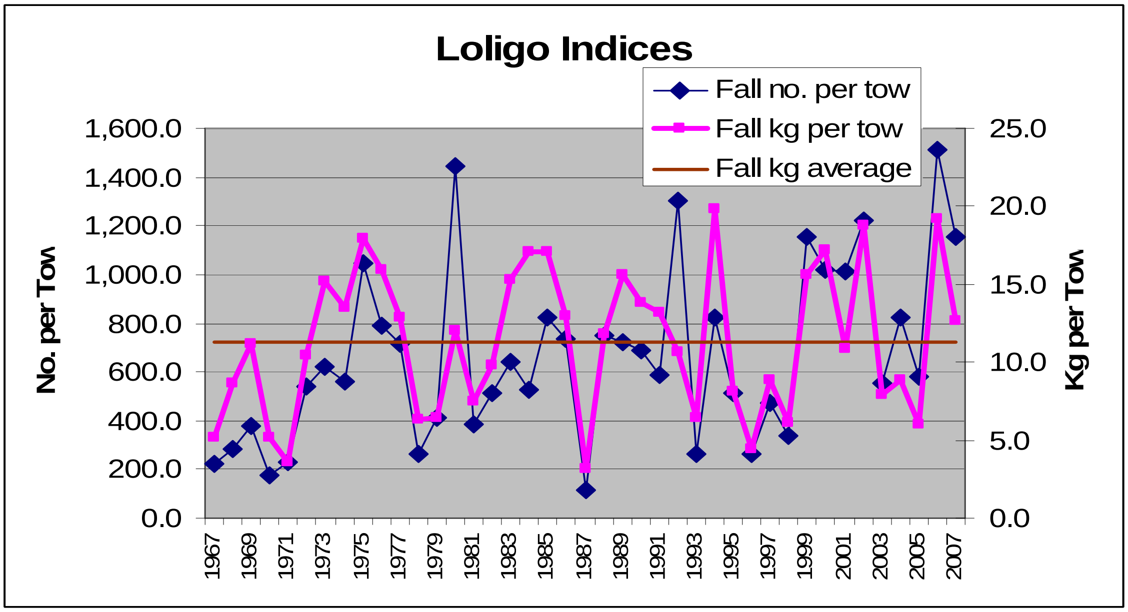

Figure 24. Loligo Indices from NEFSC Fall survey.

6.6.4.2 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 food fish 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 (Figure 25).

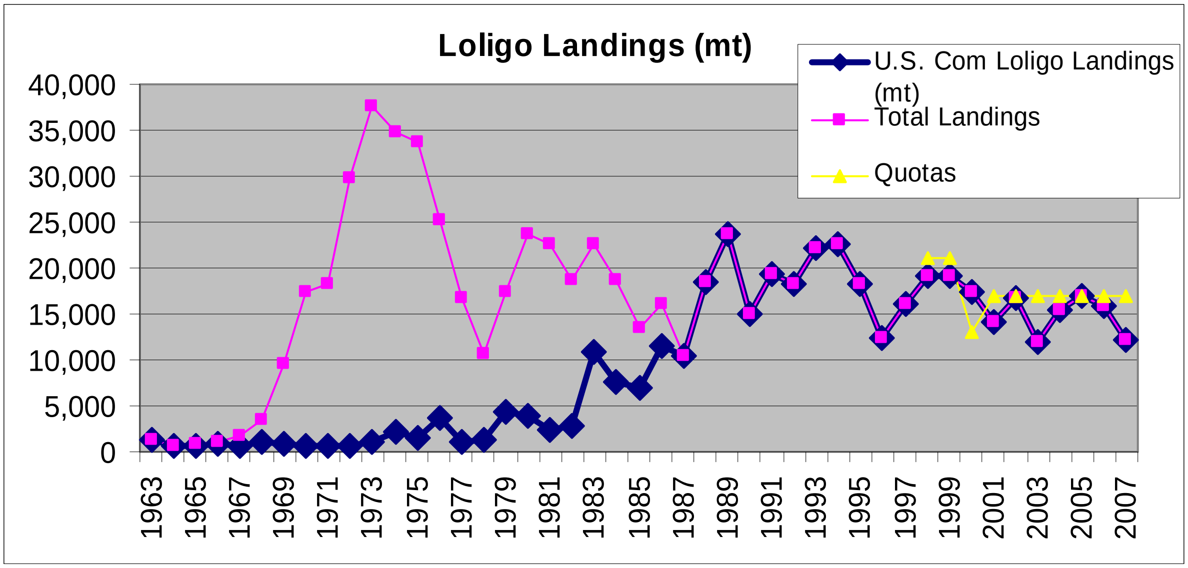

Figure 25. Landings of Loligo in the U.S. EEZ, 1963-2007.

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* landings 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 centuries, 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 offshore waters until the 1980's. Analysis of NMFS weighout data 1982-2007 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) below in figures 26, 27, and 28.

As described in the alternatives, the Loligo quota is currently divided up into trimesters but has been divided up into quarters in previous years. Each seasonal time period closes at a threshold of the seasonal allocation, which results in seasonal closures. The seasonal closures that have occurred are:

Year	Closures
2000	March 25-Apr 30; Jul 1-Aug 31; Sep 7-Dec 31;
2001	May 29-Jun 30;
2002	May 28-Jun30; Aug 16-Sep 30; Nov 2 -Dec 11; Dec 24-Dec31;
2003	Mar 25-Mar 31;
2004	Mar 5- Mar 31;
2005	Feb 20-Mar 31; April 25-Jun 30; Dec 18-Dec 31;
2006	Feb 13-Mar 31; April 21-April 26; May 23-June 30; Sept 2-Sept 30;
2007	April 13-April 30;
2008	July 17 - Aug 31.

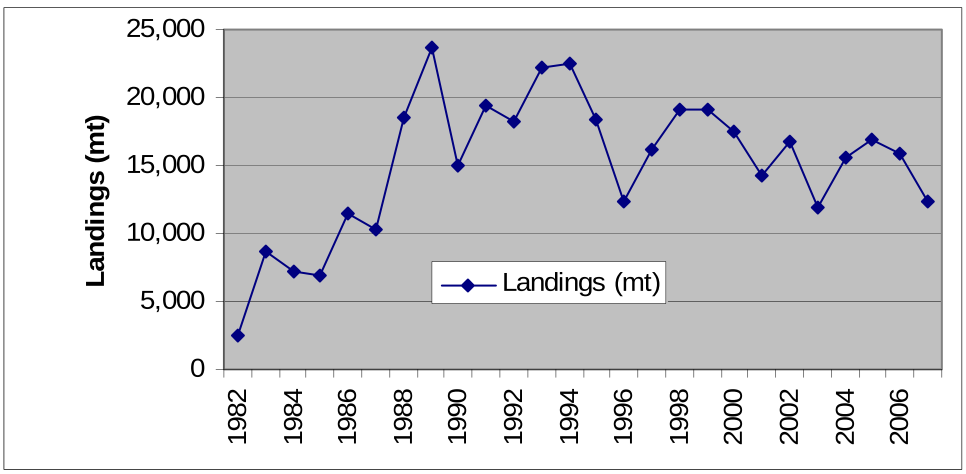

Figure 26. U.S. *Loligo* landings.

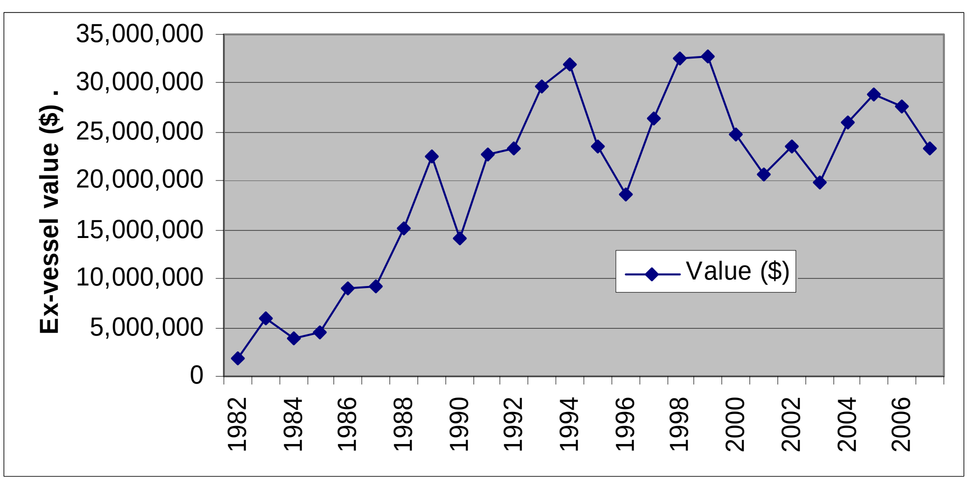

Figure 27. U.S. *Loligo* ex-vessel revenues.

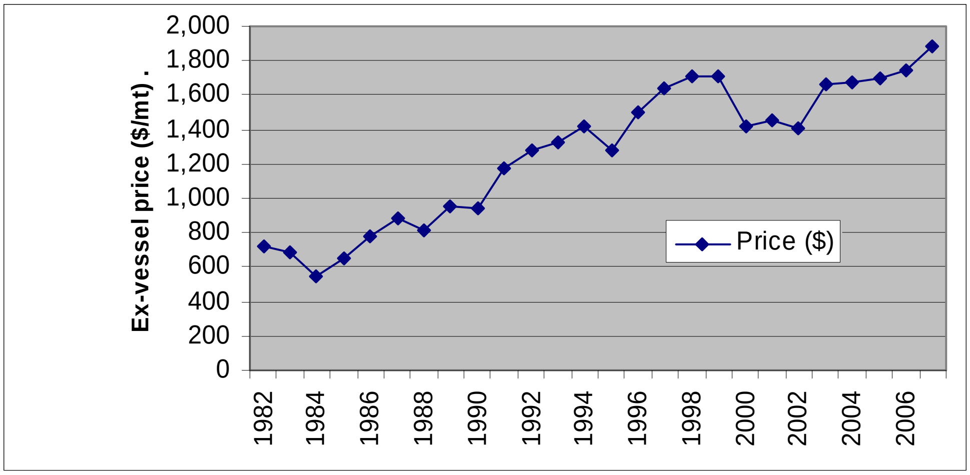

Figure 28. U.S. *Loligo* ex-vessel prices.

6.6.4.3 2007 Commercial Fishery

The following tables (34-42) describe, for *Loligo* in 2007, the total landings, value, numbers of vessels making landings, numbers of trips landing *Loligo* (Table 34), landings by state (Table 35), landings by month (Table 36), landings by gear (Table 37), landings by port (Table 38), ports most dependent on *Loligo* (Table 39), numbers of permitted and active vessels by state (Table 40), numbers of permitted and active dealers by state (Table 41), and landings by NMFS federal permit category (Table 42).

Table 34. Total landings and value *Loligo* during 2007.
(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NE Permits or Hull Numbers are considered. As such, these numbers are somewhat underestimated.)

	Landings (mt)	Value ($)	Vessels	Trips
Loligo	12,342	23,241,325	391	8,389

Source: Unpublished NMFS dealer reports

Table 35. *Loligo* landings (mt) by state in 2007.

State	Landings (mt)	Pct of Total
Rhode Island	7,200	58%
New York	2,466	20%
New Jersey	1,413	11%
Massachusetts	857	7%
Connecticut	368	3%
Virginia	22	0%
North Carolina	14	0%
Maryland	1	0%
Maine	0	0%
Totals	12,342	100%

Source: Unpublished NMFS dealer reports

Table 36. ***Loligo*** **squid landings (mt) by month in 2007.**

MONTH	Landings (mt)	Pct of Total
January	1985	16%
February	1296	10%
March	2896	23%
April	848	7%
May	494	4%
June	148	1%
July	405	3%
August	465	4%
September	132	1%
October	748	6%
November	1062	9%
December	1865	15%
Totals	12342	100%

Source: Unpublished NMFS dealer reports

Table 37. ***Loligo*** **landings (mt) by gear category in 2007.**

GEAR NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	9990	81%
UNKNOWN	1325	11%
DREDGE, OTHER	602	5%
TRAWL,OTTER,MIDWATER	272	2%
Other	152	1%
Totals	12342	100%

Source: Unpublished NMFS dealer reports

Table 38. *Loligo* landings by port in 2007.

Port Name	State	Landings (mt)	Pct of Total
POINT JUDITH	RHODE ISLAND	3,824	31%
NORTH KINGSTOWN	RHODE ISLAND	2,817	23%
MONTAUK	NEW YORK	1,559	13%
CAPE MAY	NEW JERSEY	1,256	10%
HAMPTON BAYS	NEW YORK	575	5%
NEWPORT	RHODE ISLAND	483	4%
NEW BEDFORD	MASSACHUSETTS	414	3%
NEW LONDON	CONNECTICUT	275	2%
BOSTON	MASSACHUSETTS	192	2%
SHINNECOCK	NEW YORK	130	1%
POINT LOOKOUT	NEW YORK	129	1%
STONINGTON	CONNECTICUT	90	1%
POINT PLEASANT	NEW JERSEY	79	1%
BELFORD	NEW JERSEY	78	1%
LITTLE COMPTON	RHODE ISLAND	75	1%
HYANNISPORT	MASSACHUSETTS	71	1%
OTHERS		295	2%
Totals		12,342	100%

Source: Unpublished NMFS dealer reports

Table 39. Value of *Loligo* landings by port compared to total value of all species landed by port in 2007 where *Loligo* comprised >= 1% of total value.

Port Name	State	Vessels	Value of All Species	Value of Loligo	Percent of Total Revenue derived from Loligo
WOODS HOLE	MA	9	$148,787	$89,214	60%
NORTH KINGSTOWN	RI	6	$10,303,954	$5,434,119	53%
SHINNECOCK	NY	20	$670,123	$233,153	35%
NEW YORK CITY	NY	CI	CI	CI	20%
POINT JUDITH	RI	75	$36,740,494	$7,025,114	19%
HAMPTON BAY	NY	37	$6,075,780	$1,161,677	19%
MONTAUK	NY	29	$17,739,034	$3,345,538	19%
POINT LOOKOUT	NY	5	$1,856,535	$243,021	13%
NEW LONDON	CT	CI	CI	CI	13%
OTHER BARNSTABLE	MA	9	$1,272,928	$128,636	10%
NEWPORT	RI	14	$12,366,388	$833,360	7%
HYANNISPORT	MA	8	$2,571,043	$172,950	7%
FALMOUTH	MA	9	$1,681,697	$87,507	5%
BELFORD	NJ	15	$3,148,661	$163,350	5%
LITTLE COMPTON	RI	9	$3,040,191	$138,199	5%
CAPE MAY	NJ	56	$52,888,290	$1,953,661	4%
FREEPORT	NY	CI	CI	CI	3%
AMMAGANSETT	NY	CI	CI	CI	3%
BOSTON	MA	6	$12,587,685	$302,517	2%
STONINGTON	CT	CI	CI	CI	2%
GROTON	CT	CI	CI	CI	1%
GREENPORT	NY	5	$488,953	$5,151	1%

Source: Unpublished NMFS dealer reports

Table 40. *Loligo*-butterfish moratorium vessel permit holders in 2007 by homeport state (HPST) and how many of those vessels were active (landed Loligo)

HPST	Moratorium Permitted Vessels	Active Vessels
MA	107	31
NJ	85	49
RI	64	56
NY	60	46
NC	22	14
ME	17	.
VA	12	1
CT	8	4
PA	4	1
MD	2	1
NH	1	.
WV	1	1

Source: Unpublished NMFS dealer reports

(Note: Table 40 numbers are less than Table 34 numbers because Table 40 only includes vessels with federal moratorium permits)

Table 41. Atlantic mackerel, squid, butterfish dealer permit holders by state and how many were active (bought *Loligo)* in 2007 by state.

ST	Permitted Dealers	Active Dealers
NY	108	36
RI	46	20
MA	161	17
NC	35	13
NJ	71	10
VA	31	7
MD	15	2
CT	10	1
ME	33	1
AL	1	.
CA	1	.
DE	6	.
FL	7	.
GA	1	.
HI	1	.
LA	3	.
NH	13	.
NS	1	.
PA	4	.
SC	1	.
VI	1	.

Source: Unpublished NMFS dealer reports

Table 42. *Loligo* landings by permit category for the period 1998-2007.

Year	Loligo/Butterfish Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		**Total**	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
1998	18,263	96%	0	0%	126	1%	734	4%	19,123	21,000
1999	18,214	95%	0	0%	215	1%	680	4%	19,109	21,000
2000	16,280	93%	0	0%	393	2%	802	5%	17,475	13,000
2001	13,423	94%	6	0%	170	1%	640	4%	14,238	17,000
2002	15,279	91%	4	0%	408	2%	1,016	6%	16,707	17,000
2003	10,988	92%	0	0%	98	1%	850	7%	11,935	17,000
2004	14,052	90%	1	0%	158	1%	1,355	9%	15,566	17,000
2005	15,274	90%	11	0%	75	0%	1,621	10%	16,981	17,000
2006	14,182	89%	0	0%	275	2%	1,451	9%	15,907	17,000
2007	11,227	91%	0	0%	199	2%	916	7%	12,342	17,000

6.6.4.5 Description of areas fished

The 2007 landings of *Loligo* by NMFS three digit statistical area are given in Table 43. Statistical areas 525, 562, 622, and 616 accounted for the majority of *Loligo* landings.

Table 43. Statistical areas from which 1% or more of *Loligo* were landed in 2007.

Stat Area	Landings (mt)	Percentage from area
525	2,307	17%
562	2,095	16%
622	1,932	14%
616	1,256	9%
537	1,195	9%
526	977	7%
632	650	5%
626	632	5%
613	562	4%
612	531	4%
636	190	1%
539	168	1%
611	140	1%
621	135	1%
538	131	1%
75	123	1%
623	95	1%

Source: Unpublished NMFS VTR reports

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

7.1 Impacts of Alternatives for Atlantic mackerel

7.1.1 Biological Impacts on Managed Resource and Non-Target Species

Managed Resource

Table 44. Atlantic mackerel specifications considered for 2009. All numbers are metric tons except for the trip limits, which are in pounds.

	ABC	IOY	DAH	DAP	JVP	TALFF	Inc. Trip Limits
Alt. 1	156,000	115,000	115,000	100,000	0	0	20,000
Alt. 2	156,000	115,000	115,000	100,000	0	0	20,000/50,000
Alt. 3	156,000	115,000	115,000	100,000	0	0	50,000

The three alternatives considered for Atlantic mackerel specifications for 2009 are fully described in section 5.1 and are summarized in Table 44 above (alternative 2 is the preferred alternative). Changes to measures other than incidental trip limits during a directed fishery closure were not considered. Thus all measures maintain 2008 specifications that ABC = 156,000 mt, IOY=115,000 mt, DAH=115,000 mt, and DAP=100,000 (the Regional Administrator can increase the IOY up to, but not to exceed, the ABC specification through an in-season adjustment; see section 648.21 of the Federal Code of Regulations). Also, up to 3% of the IOY may be set aside for scientific research.

SARC 42 provided deterministic projections for 2008 biomass of 2,043,440 mt (well above Bmsy) and associated catch of 211,000 mt assuming that 2005-2007 landings were ~112% higher than they actually turned out to be (note that Canadian portion of the 2007 landings are considered preliminary and possibly incomplete, see discussion below). It should be noted that the projected landings are the result of an unusually large year-class (1999) present in 2005, and are expected to decline to MSY (89,000 mt - 148,000) in the future when more average recruitment conditions exist in the stock.

There were no projections done for 2009. The Monitoring Committee recommended using the 2008 projection for 2009. Given the relatively low landings 2005-2008, all else being equal, stock size should have been even higher than predicted for 2008, and NEFSC indices do not supply contradictory evidence. Thus in the absence of new projections, maintaining the 2008 levels in 2009 should result in a conservatively low ABC. The Atlantic Mackerel, Squid and Butterfish Committee and Council subsequently adopted this ABC specification at their June 2008 meeting. The specification of ABC under all alternatives would maintain the 2008 status quo specification of ABC for Atlantic mackerel at 156,000 mt. ABC= (Yield at Ftarget) - (expected Canadian catch) so ABC= (211,000) - (55,000) = 156,000 mt. Since 2007 Canadian landings are incomplete, projected Canadian landings are assumed equal to the highest landing in the last five years (Table 45 - Gregoire, pers. comm.), 54,279 mt, which when rounded up to the nearest thousand, equals 55,000 mt. Since no changes in quotas are considered (none are indicated by the best available science), there should be no impacts on managed or non-target species related to the specification of ABC, IOY, DAH, DAP, JVP, of TALFF.

Table 45. Reported Canadian landings of Atlantic mackerel used in calculation of US ABC.

Year	Canadian landings (mt)
2003	44,475
2004	53,365
2005	54,279
2006	53,649
2007	50,578

Trip Limits

The alternatives have different incidental trip limits proposed. Alternative 1 (status quo) proposes to maintain the current 20,000 pound incidental trip limit. Alternative 2 (preferred alternative), proposes a conditional trip limit designed to prevent regulatory discarding of mackerel that could occur in the summer herring fishery, when some Atlantic mackerel are mixed with herring. Under Alternative 2, there would be a 20,000 pound trip limit if the directed fishery closes before June 1 and a 50,000 pound trip limit if the directed fishery closes after June 1. Under Alternative 3, there would be a 50,000 incidental trip limit in effect once the directed fishery closes, regardless of the directed fishery closure date.

No additional impacts to Atlantic mackerel or non-target species would occur under the status quo, Alternative 1, beyond those that occurred in 2008. The same is expected for Alternative 2 for several reasons. First, it is not anticipated that significant directed fishing on Atlantic mackerel would occur after June 1, due to lack of availability (see table 4), so the higher trip limit after June 1 would not be likely to lead to a quota overage (the directed fishery closes at 90% of DAH). Since relative to the quota, typically very few mackerel are landed after June 1, it is unlikely that the 10% buffer would be landed between June 1 and December 31. Plus, IOY is reduced from ABC, and the ABC is reduced from landings at Fmsy, so it is very unlikely that overfishing would occur even if IOY were to be marginally exceeded.

Regarding Alternative 3, since there has never been a closure of the Atlantic mackerel fishery, it is difficult to predict what might happen if there was a closure early in the year and there was a 50,000 pound trip limit when mackerel were still available to the fleet. Qualitatively, if there was a 50,000 pound trip limit in effect when directed fishing would typically occur, one would expect more effort and that there would be a greater likelihood that the quota might be marginally exceeded as compared to a 20,000 trip limit since some vessels might direct on mackerel given the higher trip limit if a closure pushes prices up (the 20,000 trip limit was demonstrated in the 2008 specifications EA to involve a low risk that the quota would be exceeded in the event of a directed fishery closure).

Regarding mackerel's availability as prey, Alternatives 1 and 2 are not expected to significantly change effort or total catch, so one would not expect any negative impacts in terms of mackerel's availability as prey since assumptions about natural mortality are made implicitly in the calculation of MSY. While unlikely (most mackerel landings occur on trips much larger than 50,000 pounds), if Alternative 3 led to directed effort after a closure and subsequent marginal overage of the mackerel quota, there could be some minor negative impacts in terms of mackerel's availability as prey, but it is not possible to quantify the effects. Plus, IOY is reduced from ABC, and the ABC is reduced from landings at Fmsy, so it is very unlikely that overfishing would occur even if IOY were to be marginally exceeded.

Non-Target Species

The primary species taken incidentally and discarded in the directed MSB fisheries over the most recent five years of data (2003-2007) are listed in Table 46. Butterfish is not included because it is primarily an incidental catch and thus it is difficult to identify butterfish trips without double counting. The species listed included those that comprised at least 2% (rounded) of all discards by weight, regardless of the ratio of discards to targeted catch. Thus a particular species could be included on this list but likely have a very low amount of discarding relative to the total landings of the targeted species, depending on the total amount of discarding observed.

Based on this criteria, for trips which landed 5,000 pounds of more of Atlantic mackerel and mackerel made up at least 25% of the kept catch based on the unpublished NMFS sea sampling data for the 2003-2007, the species of importance based on this criteria included Atlantic mackerel, spiny dogfish, Atlantic herring, scup, and blueback herring. These species will be impacted to some degree by the prosecution of the Atlantic mackerel fishery. However, an IOY specification of 115,000 mt is not expected to significantly increase or re-distribute fishing effort by gear type in 2009 since this level of IOY represents the 2008 status quo. An in season adjustment up to ABC under all three alternatives could result in an increase in fishing effort relative to the IOY specification of 115,000 mt. The biological significance of increased bycatch associated with these alternatives is difficult to quantify given current information, but it is anticipated that the increase would be not be significant.

Regarding non-target species and the incidental trip limits, Alternatives 1 and 2 are not expected to significantly change effort, so negative impacts are not expected, compared to the impacts that ocurred in 2008. While unlikely (most mackerel landings occur on trips much larger than 50,000 pounds), if Alternative 3 led to additional effort after a closure compared to the status quo, there could be some negative impacts in terms of non-target species, but it is not possible to quantify the effects, though they would be expected to be relatively small compared to the overall mortality of these species.

Table 46. Key species taken and discarded in directed trips for Atlantic mackerel, *Illex*, and *Loligo* based on unpublished NMFS Northeast Fisheries Observer Program data from 2003-2007. (see text for criteria)

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For 100 pounds of directed species caught, pounds of given species discarded.	Of all discards observed, percent that comes from given species	Percent of given species that was discarded
Mackerel (Trips landing at least 5000 pounds and 25% mackerel)					
MACKEREL, ATL	19,113,400	216,493	1.13	49%	1%
DOGFISH SPINY	118,563	113,531	0.59	25%	96%
HERRING, ATL.	1,079,615	57,593	0.30	13%	5%
SCUP	42,208	42,207	0.22	9%	100%
HERRING, BLUE BACK	40,965	8,444	0.04	2%	21%

Table 46 (continued)

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For 100 pounds of directed species caught, pounds of given species discarded.	Of all discards observed, percent that comes from given species	Percent of given species that was discarded
Illex (Trips landing at least 50% Illex)					
SQUID (ILLEX)	12,707,432	145,672	1.15	63%	1%
BUTTERFISH	42,594	28,987	0.23	12%	68%
HAKE, SPOTTED	13,719	13,719	0.11	6%	100%
DORY, BUCKLER (JOHN)	10,062	7,782	0.06	3%	77%
DOGFISH SPINY	6,834	6,834	0.05	3%	100%
MACKEREL, CHUB	4,786	4,508	0.04	2%	94%
BEARDFISH	3,773	3,766	0.03	2%	100%
Loligo (Trips landing at least 50% Loligo)					
HAKE, SILVER	434,038	317,080	6.22	13%	73%
HAKE, SPOTTED	300,040	295,404	5.79	12%	98%
SQUID (ILLEX)	313,166	281,526	5.52	11%	90%
DOGFISH SPINY	266,574	266,057	5.22	11%	100%
BUTTERFISH	279,939	255,124	5.00	10%	91%
SQUID (LOLIGO)	5,098,032	145,446	2.85	6%	3%
HAKE, RED	143,982	135,035	2.65	5%	94%
MACKEREL, ATL	213,455	120,518	2.36	5%	56%
FLOUNDER, FOURSPOT	90,943	90,938	1.78	4%	100%
HAKE, NK	63,842	62,812	1.23	2%	98%
FLOUNDER, SUMMER	142,407	51,527	1.01	2%	36%
SKATE, LITTLE	50,024	50,024	0.98	2%	100%
ANGLER	81,668	40,743	0.80	2%	50%

7.1.2 Habitat Impacts

Since the IOY/ABC under the all three alternatives represents the status quo specification, it should not result in an increase in fishing effort or redistribute effort by gear type and, therefore no negative impacts on habitat (relative to the status quo) are anticipated as a result of the proposed specification of IOY/ABC under all three alternatives. Related to the trip limits, fishing effort is not expected to increase with Alternative 1 (the status quo) or Alternative 2 (because very few mackerel are caught after May).

Regarding Alternative 3, since there has never been a closure of the Atlantic mackerel fishery, it is difficult to predict what might happen if there was a closure early in the year and there was a 50,000 pound trip limit when mackerel were still available to the fleet. Qualitatively, if there was a 50,000 pound trip limit in effect when directed fishing would typically occur, one would expect that there could be a greater likelihood that more effort could occur than the status quo. Thus compared to the status quo, Alternative 3 could possibly lead to higher effort and since a small portion of mackerel landings are obtained with bottom trawl gear, some minimal increased level of negative impact on habitat could occur.

In-season adjustment to OY

As noted above, current regulations allow the Council and NMFS to increase optimum yield (OY) for mackerel during the fishing season up to a level not to exceed ABC through an in season adjustment to IOY. The FMP allows the Council and NMFS to specify an initial optimum yield in amount less than or equal to ABC. Under all three alternatives considered by the Council, the initial optimum yield was specified at 115,000 mt, but the ABC specifications are 156,000 mt. An in-season adjustment up to ABC could potentially result in an increase in fishing effort under any of the three alternatives considered compared to the initial specification or relative to the status quo measured either as recent landings or specification of IOY. However, this fishery is prosecuted primarily with mid-water trawls, which do not contact the seabed. If an in-season adjustment is necessary and includes an expanded use of bottom trawls as well as mid-water trawls, then some increased but unquantifiable level of impact on habitat could occur.

7.1.3 Impacts on Endangered and Other Protected Species

ESA-listed cetaceans and others protected under the MMPA (described in section 6.4) 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 January through April 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. However, observation records for the time period (1994 to 2006) show there were no known interactions between the Atlantic mackerel fishery and ESA-listed cetacean species. The most recent Northwest Atlantic mackerel stock assessment was at SAW-42 (NMFS 2006).   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 is not expected to deplete the food source to such an extent that any whales that compete for the food resource will be adversely affected.

The distribution of sea turtles 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. Loggerheads are also unlikely to catch or target fast moving fish such as mackerel. Thus, interactions between sea turtles and the Atlantic mackerel fishery are not anticipated. In fact, NMFS at-sea observer data for the period 1994- 2007 indicate that no interactions were observed between the mackerel sink gillnet and otter trawl fishery and sea turtles.

Based on the analysis of observed mortalities given in Waring *et al.* (2007), the three cetacean species of primary concern in the prosecution of the Atlantic mackerel fishery include common dolphins and two species of pilot whales. As noted above, all three alternatives considered represent the 2008 status quo IOY and therefore no increase in fishing effort is expected related to the quotas. Related to the trip limits, fishing effort is not expected to increase with Alternatives 1 and 2. Therefore, the implementation of any of these alternatives considered are not expected to increase the chance of an interaction with common dolphins and/or pilot whales compared to the 2008 status quo. Alternative 3 could lead to higher effort compared to the status quo (see 7.1.2 for explanation) so the possibility of an interaction could increase but the likelihood is unquantifiable and the impact would be expected to be minor.

In-season adjustment to OY

The FMP allows the Council and NMFS to specify an initial optimum yield in amount less than or equal to ABC. As noted above, current regulations allow the Council and NMFS to increase optimum yield (OY) for mackerel during the fishing season up to a level not to exceed ABC through an in-season adjustment to IOY. Under all three alternatives considered by the Council, the initial optimum yield was specified at 115,000 mt, but the ABC specifications are 156,000 mt. The ABC represents the maximum level to which IOY could be increased to during the fishing season should the need arise. An in-season adjustment up to ABC could potentially result in an increase in fishing effort under any of the three alternatives considered compared to the initial specification or relative to the status quo measured either as recent landings or specification of IOY. The Council concluded that an increase in fishing effort in the mackerel fishery as a result of an in-season adjustment has the potential to increase the number of interactions with common dolphins. However, the anticipated levels of interactions with common dolphins due to an in season adjustment in IOY up to ABC under the three alternatives considered by the Council can't be quantified given current information. The Council is participating in the development of a take reduction plan which includes common dolphins (see 6.4.2). NMFS has convened an Atlantic Trawl Gear Take Reduction Team (ATGTRT) as part of a settlement agreement between the Center for Biological Diversity (CBD) and NMFS to address the incidental mortality and serious injury of long-finned pilot whales, short-finned pilot whales, common dolphins and white sided dolphins in a number of trawl gear fisheries operating in the Atlantic Ocean. As noted in section 6.4 of this EA, takes of pilot whales, common dolphins and white-sided dolphins have occurred in fisheries operating under the Atlantic Mackerel, Squid, and Butterfish FMP as well as in mid-water and bottom trawl fisheries in the Northeast. As noted above, the species of principal concern in the directed mackerel fishery are common dolphins. The western North Atlantic stocks of pilot whales, common dolphins, and white-sided dolphins were designated as non-strategic in the 2007 Marine Mammal Stock Assessment Report.

7.1.4 Impacts on Human Communities

The Council selected an IOY under all three alternatives that is consistent with the recent increases in processing capacity and domestic landings of mackerel. The recent increase in US processing capacity in conjunction with high world demand has created conditions which are favorable for continued growth of the US mackerel fishery. Industry testimony from shore side processors indicated that the ability and intent exist to land and process well in excess of 100,000 mt of Atlantic mackerel in 2009. To reach this level, the Atlantic mackerel stock will need to be sufficiently abundant and available in the right sizes to the harvest sector (unlike the situation in 2007 and 2008). Industry members have testified that if stock conditions are similar to those prior to 2005, then they fully intend and expect to land the entire IOY.

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 surplus existed between ABC and DAH for many years, that surplus has disappeared due to the downward revision in the estimate of MSY from SARC 42 and recent increases in both US and Canadian landings. Therefore, the Council concluded that no surplus exists between the US portion of the sustainable yield from this stock and the IOY for 2009. As a result TALFF is specified as zero under all three alternatives considered by the Council. 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 proposed 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 specifying an IOY that results in zero TALFF will yield positive social and economic benefits to the mackerel fishery and to the Nation.

All three alternatives include a JVP specification of zero. In years prior to 2005, 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 systematically reduced JVP because it has 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. US shore side processing capabilities for mackerel have expanded as a result of increased capacity at existing plants in Cape May, NJ as well as the addition of new processing facilities in New Bedford and Gloucester, MA. As a result of the significant expansion in shore side processing capacity in recent years, the Council concluded that shore side processing capacity was no longer a limiting factor relative to domestic production of Atlantic mackerel. In addition to the recent increases in domestic processing capacity, the Council noted that there was no or minimal JVP activity during last few years that JVP was specified above zero. For example, JVP landings of Atlantic mackerel were 0 in 2000, <1 mt in 2001, 1,787 mt in 2002 and then declined to 0 again in 2003 and 2004. Thus, the Council's conclusion that DAH=DAP in 2009 was based, in part, on the fact no JVP activity has occurred for Atlantic mackerel since 2002.

Since the specification of IOY/ABC under all three alternatives is the same as the 2008 specification of IOY, there are no social or economic impacts anticipated on human communities as result of the proposed specifications for 2009 related to the quotas. Regarding the trip limits, since there has never been a closure of the Atlantic mackerel fishery, it is difficult to predict how the fishery will operate under the different proposed incidental trip limit alternatives. Changes in fleet behavior are not expected under Alternatives 1 and 2. However, Alternative 2 could prevent possible regulatory discarding of mackerel in the summer herring fishery, leading to relatively small positive economic impacts. As described in section 7.1.1, regarding Alternative 3, since there has never been a closure of the Atlantic mackerel fishery, it is difficult to predict what might happen if there was a closure early in the year and there was a 50,000 pound trip limit when mackerel were still available to the fleet. Qualitatively, if there was a 50,000 pound trip limit in effect when directed fishing would typically occur, one would expect that there would be more effort and thus a greater likelihood that the quota might be exceeded as compared to a 20,000 trip limit since some vessels might direct on mackerel given the higher trip limit if a closure pushes prices up (the 20,000 trip limit was demonstrated in the 2008 specifications process to involve a low risk that the quota would be exceeded in the event of a directed fishery closure). Thus there could be revenue gains because of the higher trip limit if the fleet stayed within the quota, but revenue losses in the unlikely event that the sustainability of the fishery was compromised. Impacts would be likely to be small given the price of mackerel and the size of the overall quota compared to a 50,000 pound trip limit.

In-season adjustment up to ABC

As noted above, all three alternatives represent the status quo for 2009 in terms of IOY (compared to 2008). Therefore, no changes in landings of Atlantic mackerel are expected compared to the status quo and therefore, there should be no changes in social and economic benefits to the ports and communities dependent on mackerel under each of these alternatives for IOY. However, the IOY for mackerel could be increased during the fishing season up to a level not to exceed ABC through an inseason adjustment. Under all three alternatives considered by the Council, the initial optimum yield was specified at 115,000 mt, and the ABC specification was 156,000 mt. An inseason adjustment up to ABC could potentially result in an increase in landings and hence revenue under all three alternatives considered compared to the status quo measured either as recent landings or the 2008 specification of IOY.

Under the alternatives, an in-season adjustment of IOY (115,000 mt) up to ABC (156,000 mt) would represent an increase of about 36% in landings and revenue (assuming a constant ex-vessel price of $258/mt; see Figure 9). This would amount to an increase of about $10.6 million in total revenue or $36,152 per vessel (based on the total of 293 vessels which landed mackerel in 2007). This assessment assumes that the additional revenue realized as a result of an in-season adjustment would be shared equally across all vessels active in the fishery. In fact, a relatively small number of vessels account for a relatively large share of the mackerel landings in any given year (i.e., roughly 25-30 vessels account for greater than 90% of the mackerel landings). These vessels would likely benefit to a much greater extent than the average vessel in the fishery under alternatives 1, 2, or 3, assuming an in-season adjustment up to ABC occurred.

7.2 *Illex*

7.2.1 Biological Impacts on Managed Resource and Non-Target Species

The Council considered three quota options for *Illex* in 2009. Alternative 1 would maintain the 2008 specifications in 2009 (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 2009 (same as in 2008). Other management actions remain status quo. Thus 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. Also the same as last year, vessels which possess *Illex* incidental catch permits may land up to 10,000 pounds per trip at all times and up to 3% of the ABC/IOY/DAH/DAP for *Illex* may be set aside for scientific research. In summary, 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 is it expected to significantly impact non-targeted species compared to the 2008 fishing year.

In setting the quota for 2009, the Council considered the management advice provided by recent stock assessments (SAW 37 and SAW 42) 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 2009 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 landings 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 2009, 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 two years - 1998 and 2004. 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. 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 the majority of 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 2009, the current FMP does allow for in-season adjustments to the IOY (i.e., either upward or downward).

The species taken incidentally and discarded in the directed *Illex* fishery are listed in Table 46. The species listed included those that comprised at least 2% (rounded) of all discards by weight on trips with kept catch at least 50% *Illex* by weight (based on unpublished NMFS sea sampling data for the 2003-2007). The species of importance based on this criteria included Illex, butterfish, spotted hake, John Dory Bucklers, spiny dogfish, chub mackerel, and beardfish. Alternative 1 is not expected to significantly increase or re-distribute fishing effort by gear type in 2009. Therefore, no additional negative biological consequences for non-target species are expected compared to the 2008 specifications.

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*, 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 46. All of these species will be impacted to some degree by the prosecution of the *Illex* fishery. Alternative 2 could reasonably be expected to increase or re-distribute fishing effort by gear type in 2009 if market condiiotns are favorable. Therefore, the proposed measures under Alternative 2 could negatively impact the non-target fish species listed in Table 46 compared to the status quo. However, this level of ABC would be expected to only minimally impact the non-target fish species listed in Table 46 because the mortality rates of non-target species due to the *Illex* fishery are expected to be minimal compared to other sources of mortality.

The third alternative evaluated in this environmental assessment was the specification of the quota for *Illex* at 19,000 mt (Alternative 3). 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 additional negative biological consequences for the *Illex* stock, predator species, or non-target species compared to the 2008 specifications since the measure is not expected to increase or redistribute fishing effort by gear type, especially because the mortality rates of non-target species due to the *Illex* fishery are expected to be minimal compared to other sources of mortality.

7.2.2 Impacts on Habitat

Illex are taken almost exclusively by bottom otter trawls. Since Alternative 1 (status quo) is not expected to change effort, no changes to impacts on EFH are expected. Because in the last 26 years landings have only twice exceeded the lower Alternative 3 quota (19,000 mt), no changes to impacts on EFH are expected compared to 2008 but there could be some unquantifiable benefit to EFH in the apparently unlikely but occasional event that Illex landings did approach 19,000 mt. Specifications for *Illex* under alternative 2 (30,000 mt) could result in an increase in fishing effort or redistribute effort by gear type (if market conditions are favorable). 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, and since the Illex fishery rarely meets even its current quota (24,000 mt), it is possible that no impacts would occur.

7.2.3 Impacts on Endangered and Other Protected Species

Section 6.4 describes available information relative to fishery interactions with protected resources and the Atlantic mackerel, squid and butterfish fisheries. Based on an analysis of available observer data, the cetaceans of primary concern relative to the prosecution of the *Illex* fishery are pilot whales. The NMFS has convened a take reduction team to develop measures to reduce the take of common dolphins and pilot whales in offshore Atlantic trawl fisheries, including the *Illex* fishery. See section 6.4.2 for details on this take reduction team.

While the impact on these cetacean stocks by the *Illex* fishery is difficult to quantify, 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 is not expected to increase the impacts to protected species described in section 6.4 relative to 2008 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 (if market conditions are favorable). Therefore, this alternative for *Illex* could negatively impact the protected species described in section 6.4 relative to 2008 specifications for *Illex*, although the extent of such impacts cannot be quantified. There are no known interactions between the *Illex* fishery and any ESA listed species including sea turtles.

7.2.4 Impacts on Human Communities

Alternative 1 for *Illex* in 2009 represents the 2008 status quo, so no reductions in landings or revenues due to the 2009 specifications under this alternative are expected. Therefore, no changes 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 26 and 27 are expected to be significantly affected by this quota alternative for the 2009 annual specifications for *Illex*. In addition, Alternative 2 represents no constraint on the fishery relative to recent landings (it is higher). So this alternative is also not expected to have any negative effect on the ports and communities which are dependent on the *Illex* fishery in the short term, but could have negative impacts in the long term if the sustainability of Illex was compromised (see biological impacts above). Compared to the 2004 *Illex* landings, alternative 3 would represent a restriction on landings of about 6,000 mt. However, compared to average landings over the past three to five years, alternative 3 would represent no constraint on landings. Therefore, while there is some chance that alternative 3 could have negative economic consequences for the ports given in Tables 26 and 27, it is more likely that there would be no negative economic consequences as a result of this alternative.

7.3 Butterfish

7.3.1 Biological Impacts on Managed Resource and Non-Target Species

Changes to measures other than quotas were not considered. Thus all alternatives maintain the trip limit of 5,000 pounds for moratorium butterfish permits, and maintain the threshold for butterfish minimum mesh requirement (3.0 inches) at 1,000 pounds. Also, the threshold level for directed butterfish fishery closure will still be 80% of DAH. If 80% of DAH is reached prior to Oct 1, a 250 pound daily trip limit results. If 80% of DAH is reached on/after Oct 1, a 600 pound daily trip limit results. Incidental limits are 600 pounds, reduced to 250 pound if the directed fishery closes before Oct 1. Also, Up to 3% of the IOY/DAH/DAP for butterfish may be set aside for scientific research.

The specifications under Alternative 1 (the status quo and preferred alternative) would be Max OY = 12,175 mt, ABC = 1,500 mt, and IOY, DAH, and DAP = 500 mt and JVP and TALFF = 0 mt. This represents the most restrictive alternative in terms of ABC for butterfish which was considered by the Council. The purpose of this alternative is to cap the fishery at recent levels (minimal directed fishing) while a rebuilding plan is developed and implemented under Amendment 10 to the FMP. No changes to gear or trip limits were considered.

The most recent stock assessment re-estimated MSY at 12,175 for butterfish which becomes the basis for the max OY specification as defined in the FMP. In addition, the FMP specifies that the DAH be specified as the catch associated with 75% of F_{msy}. Based on the current overfishing definition, overfishing is not occurring (NMFS 2004). However, the stock is designated as being overfished since the most recent estimate of biomass was lower than the biomass threshold of 50% B_{msy}. 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). The catch expected under Alternative 1 should achieve a fishing mortality rate well below the target rate specified in the FMP and therefore, Alternative 1 should result in positive benefits to the butterfish stock, but no change from 2008.

The specifications under Alternative 2 would be Max OY = 12,175 mt, ABC = 4,525 mt, and IOY, DAH, and DAP = 1,861 mt and JVP and TALFF = 0 mt. This alternative would revert to the 2007 specifications for 2009. Under Alternative 3, the specifications 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. This represents the least restrictive alternative in terms of ABC for butterfish which was considered by the Council. The yield under this alternative assumes that the stock would be at or above B_{msy} in 2009. 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}. Alternative 3 has been included because the butterfish stock has the potential to rebuild quickly, and once rebuilt these are the specifications that would result from the FMP control rule. Given the current level of the stock (i.e., designated as overfished), higher landings from directed fishing would likely result in overfishing and additional depletion of the spawning stock biomass. Any further reductions in spawning stock biomass will decrease the probability of successful recruitment and stock rebuilding.

For Alternatives 2 and 3, while the quota would go up, recent analyses indicate that most of the butterfish landings are taken incidentally to the prosecution of other directed fisheries. As such, an increase in butterfish landings is not necessarily caused by increased levels of directed fishing effort. Also, other measures in place (3" mesh requirement to keep 1000 pounds or more of butterfish, 5000 pound trip limit, very low incidental trip limit) make significantly increased directed fishing unlikely even if the quota was higher. Therefore, Alternatives 2 and 3 are not expected to result in an increase in fishing effort and are not expected to lead to increased butterfish fishing mortality as long as the other measures currently in place remain in effect. If effort did increase, negative impacts on the butterfish stock would result. However, the restrictions in place would mean that any increase in effort would be likely to be minimal. Thus the impacts are somewhat uncertain, likely zero but possibly minimally negative.

The reader will note in Table 32 that from 1998-2007 between 8% and 36% of butterfish landings have come from vessels without federal permits. The percentage peaked at 36% in 2004 and has declined each year since then to 16% in 2007. These landings do not present a critical problem in terms of generally tracking landings and closing the fishery, but if they are from vessels with only state permits, they could theoretically keep landing butterfish in state waters after a federal directed fishery closure and cause a quota overage. Given the lack of a strong butterfish market demand, the trajectory of landings in recent years, and the 20% closure buffer, this seems unlikely. The MSB Monitoring committee tracks the performance of the fishery on an annual basis, and if landings by unpermitted vessels become a problem, then the Monitoring Committee could recommend appropriate management measures, such as lowering the quota for federal vessels or increasing the closure buffer, so that overall mortality goals are reached.

The list of species taken incidentally and discarded in the butterfish fishery is not given because currently there is very limited directed fishing for butterfish (because of both regulations and market demand) and it is very difficult to identify a directed butterfish trip in the observer database. Prior specifications identified butterfish, red hake, silver hake, spiny dogfish, scup, unclassified skates, fourspot flounder, *Loligo* squid, Atlantic mackerel, and little skate as primary bycatch and/or discard species in the butterfish fishery. All of these species would be expected to be negatively impacted to some degree by the re-establishment of the butterfish fishery. Fishing effort under Alternative 1 would be expected to remain the same relative to 2008 so Alternative 1 is not expected to impact the non-target fish species listed above relative to 2008. For Alternatives 2 and 3, while the quotas could go up, as described above in this section, they are not expected to result in increased effort so they are not expected to increase any existing impacts on non-target species. Since as fully described in Amendment 9 and Amendment 10, most butterfish are taken as bycatch in the directed *Loligo* fishery, and some are taken in the *Illex* fishery, the reader is referred to section 7.4.1 and 7.2.1 for biological impacts of those fisheries on butterfish.

Since Alternatives 1, 2, and 3 are not expected to impact butterfish abundance, they are not expected to negatively affect the large number of species and stocks of marine mammals and fish that prey on butterfish.

7.3.2 Impacts on Habitat

Butterfish are taken with a number of gears. The gear of concern relative to habitat is bottom otter trawls which account for most of the landings in any given year (73% in 2007). However, because as described above in section 7.3.1, Alternatives 1, 2, and 3 are not likely to change levels of directed fishing effort for butterfish, relative to the 2008 specifications none of the Alternatives are expected to have any impact on EFH. If effort did increase, negative impacts on benthic habitats would also increase. However, the restrictions in place on butterfish retention would mean that any increase in effort would likely be minimal. Thus the impacts on habitat from any of the alternatives are somewhat uncertain, likely zero but possibly minimally negative, as long as the other restrictions on butterfish fishing (described above) remain in place.

7.3.3 Impacts on Endangered and Other Protected Species

The basic interactions between fisheries and protected resources are discussed in section 6.4 (see Affected Environment). As discussed in that section, these fisheries were listed as Category 1 fisheries but have recently been changed to Category 2 fisheries under MMPA. However, within the overall classification, no interactions between marine mammals and the butterfish fishery have been observed. Therefore, the impacts expected from the alternatives considered should be minimal based on available data. Also, because as described above in section 7.3.1, Alternatives 1, 2, and 3 are not likely to change levels of directed fishing effort for butterfish, relative to the 2008 specifications none of the Alternatives are expected to lead to any increased interations with the endangered or other protected species described in section 6.4. If effort did increase, negative impacts with those endangered or other protected species would also increase. However, the restrictions in place on butterfish retention would mean that any increase in effort would be likely to be minimal. Thus the impacts on relevant endangered or other protected species are somewhat uncertain, likely zero but possibly minimally negative, as long as the existing restrictions on butterfish fishing (described above) remain in place.

7.3.4 Impacts on Human Communities

Since Alternative 1 represents the 2008 status quo specifications, no reductions in landings or revenues are expected. Therefore, no change in economic and/or social impacts to the US butterfish industry would be expected. As a result, none of the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 35 and 36 are expected to be significantly affected by Alternative 1 for the 2009 annual specifications for butterfish. Alternatives 2 and 3, as described in section 7.3.1, are not expected to lead to increased effort toward butterfish. However, they could allow greater retention of incidentally caught bycatch later in the year because closures of the butterfish fishery would be less likely with a higher quota. Thus the impacts on human communities are somewhat uncertain, likely zero but possibly minimally positive.

7.4 *Loligo*

7.4.1 Biological Impacts on Managed Resource and Non-Target Species

Managed Resource

The alternatives considered for *Loligo* squid involve different annual quotas, and are fully described in section 5.4. MSY, B_{MSY} and F_{MSY} form the basis for definitions of overfishing relative to biological reference points outlined in the Magnuson-Stevens Act. Amendment 9 to the MSB FMP implemented revised proxies for calculating fishing mortality thresholds and targets as recommended by SARC 34 to keep current with the best available science. The revised proxies are calculated as follows: FTarget is the 75th percentile of fishing mortality rates during 1987 - 2000 and FThreshold is the average fishing mortality rates during the same period. The revised proxy for FTarget (0.32 or 0.24 for trimesters and quarters, respectively) will be used as the basis for establishing *Loligo* OY. The revised proxies for FTarget and FThreshold are fixed values based on average fishing mortality rates achieved during a time period when the stock biomass was fairly resilient (1987 - 2000). Changes to management measures other than quotas (e.g. seasons, closure thresh-holds, gear changes, trips limits) were not contemplated. Thus under all alternatives the annual quota will still be allocated by trimesters: January-April (43%), May-August (17%) and September-December (40%). For trimesters 1 and 2, the directed fishery will be closed when 90% of each Trimester allocation is taken; vessels will be restricted to a 2,500 pound trip limit for the remainder of the period. Overages and underages from the first two trimesters will be added to or deducted from period 3. When 95% of the total annual quota has been taken (i.e., 18,050 mt), a 2,500 pound trip limit will be implemented for the rest of the fishing year. Vessels which possess *Loligo* incidental catch permits may land up to 2,500 pounds per trip at all times and up to 3% of the ABC/IOY/DAH/DAP may be set aside for scientific research.

The Council considered three quota options for *Loligo* in 2009. Alternative 1 would maintain the 2008 specifications in 2009 (status quo). Under this alternative Max OY =26,000 mt, ABC, IOY, DAH, and DAP = 17,000 mt and JVP and TALFF = 0 mt. Alternative 2 uses the revised proxies implemented in Amendment 9 to the MSB FMP along with the management recommendations of SARC 34. Under Alternative 2 (preferred), Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 19,000 mt (SARC 34 recommended that the quota not exceed 19,000 mt) and JVP and TALFF = 0 mt. Under Alternative 3, Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 23,000 mt and JVP and TALFF = 0 mt. Alternative 3's quota amounts are generated solely from application of the new proxies for FTarget and FThreshold.

Since Alternative 1 represents the status quo, no impacts on the *Loligo* stock or on the availability of *Loligo* to predators are expected compared to 2008.

Since Alternative 2 is consistent with the FMP overfishing definition and the most recent stock assessment advice, the Council concluded that the level of exploitation associated with an ABC, IOY, DAH, and DAP specification of 19,000 mt is not expected to have any negative biological effects on the *Loligo* stock compared to 2008 (including impacts on the availability of *Loligo* to predators), especially since Alternaitve 2 involves a modest quota increase and the increase would be spread throughout the year via the trimester allocation system.

Regarding Alternative 3, the effects on the *Loligo* stock are somewhat uncertain since there is contradictory advice from SAW/SARC 34. The 23,000mt quota, a 35% increase, is the result of implementing the technical guidance of SAW/SARC 34 regarding biological reference point proxies. However, a 23,000 mt quota would contradict the management advice of SAW/SARC 34 to keep catches at or below 20,000 mt. Thus, it is possible that a quota of 23,000 mt could have negative biological consequences for the *Loligo* stock (including impacts on the availability of *Loligo* to predators), but given the contradictory SAW/SARC advice it is not possible to quantify the probability.

Non-Target Species

The species taken incidentally and discarded in the directed *Loligo* fishery are listed in Table 46. The species listed included those that comprised at least 2% (rounded) of all discards by weight on trips with kept catch at least 50% *Loligo* by weight (based on unpublished NMFS sea sampling data for the 2003-2007). The species of importance based on this criteria included silver hake, spotted hake, *Illex*, spiny dogfish, butterfish, *Loligo*, red hake, Atlantic mackerel, fourspot flounder, unclassified hake, summer flounder, little skate, and angler fish. All of these species will be impacted to some degree by the prosecution of the *Loligo* fishery. Since Alternative 1 represents the status quo, no impacts on non-target species beyond the effects experienced in 2008 are expected.

Alternative 2 increases the quota by approximately 12% so there could be concern that effort would increase, with concomitant impacts on non-target species. However, in the last five years (2003-2007) the quota has only been binding once (2005), so increasing the quota may not necessarily lead to higher effort since some other unquantified factor(s) besides the quota (e.g. availability, market demand, weather, etc) appear to be constraining landings. Thus the additional quota will not necessarily lead to additional overall effort. Given this, it is difficult to predict what levels of effort would be observed with a 19,000 mt harvest. If additional effort resulted, the species identified above could experience adverse effects, but given the modest quota increase and the apparent non-quota factors controling harvest, impacts are not expected to be more than minimal.

Again because factors other than the quota appear to be limiting landings, it is difficult to predict what effort levels would be observed with Alternative 3 compared to the status quo, i.e. a 23,000mt quota versus a 17,000mt quota. However, all else being equal, a significantly higher quota could lead to unquantifiably higher effort and thus more interactions with non-target species, including butterfish. Thus the effects on non-target species are somewhat uncertain, possibly zero or possibly negative.

7.4.2 Impacts on Habitat

Loligo are taken with a number of gears, but the gears of concern relative to habitat are bottom otter trawls which account for most of the *Loligo* landings in any given year. Alternative 1 represents the status quo and therefore would not be expected to lead to increased effort and therefore impacts to EFH.

Alternative 2 increases the quota by approximately 12% so there could be concern that effort would increase, with concomitant impacts on habitat. However, in the last five years (2003-2007) the quota has only been binding once (2005), so increasing the quota may not necessarily lead to higher effort since some other unquantified factor(s) besides the quota (e.g. availability, market demand, weather, etc) appear to be constraining landings. Thus the additional quota will not necessarily lead to additional overall effort. Given this, it is difficult to predict what levels of effort would be observed with a 19,000 mt harvest. If additional effort resulted, habitat could experience adverse effects, but given the modest quota increase and the apparent non-quota controls on harvest, impacts are not expected to be more than minimal.

Again because factors other than the quota appear to be limiting landings, it is difficult to predict what effort levels would be observed with Alternative 3 compared to the status quo, i.e. a 23,000 mt quota versus a 17,000 mt quota. However, all else being equal, a significantly higher quota could lead to unquantifiably higher effort and thus more adverse habitat impacts. Thus the effects on habitat are somewhat uncertain, possibly zero or possibly negative.

7.4.3 Impacts on Endangered and Other Protected Species

The basic interactions between the *Loligo* fishery and protected resources are discussed in section 6.4 . As previously discussed above, these fisheries were listed as category I fisheries under MMPA but were reclassified as category II fisheries in 2007. The three species of primary concern include common dolphins and pilot whales. All incidental takes of common dolphins attributed to the *Loligo* fishery were observed during the first quarter of the year (Jan-Mar), exclusively in the offshore fishery. The estimated fishery-related mortality of common dolphins attributable to the fall/winter offshore fishery was 0 between 1997-1998, 49 in 1999 (CV=0.97), 273 in 2000 (CV=0.57), 126 in 2001 (CV=1.09) and 0 in 2002-2003. The average annual mortality between 1999-2003 was 90 common dolphins (CV=0.47). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

Only one pilot whale incidental take has been observed in *Loligo* squid fishing operations since 1996. The one take was observed in 1999 in the offshore fishery. No pilot whale takes have been observed in the inshore fishery. The estimated fishery-related mortality of pilot whales attributable to the fall/winter offshore fishery was 0 between 1996 and 1998, 49 in 1999 (CV=0.97) and 0 between 2000 and 2003. The average annual mortality between 1999-2003 was 10 pilot whales (CV=0.97). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

The ESA-listed species of concern include leatherback and loggerhead sea turtles. A single leatherback sea turtle capture has been documented on observed SMB fishing trips according to the NMFS Observer Database. The animal was caught in a bottom otter trawl net in October 2001 on a trip for which *Loligo* was recorded as the target species. The animal was alive when captured and was released. No information is available on the subsequent survival of the turtle. There are no mortality estimates for leatherback turtles that are attributed to the *Loligo* fishery. A loggerhead capture was observed once in each year of 1995, 1996, and 1997 on *Loligo* trips. In every case the animal was alive when captured and no injuries were reported. In 2002, a loggerhead mortality that was likely the result of capture during a *Loligo* haul was observed. In 2004, a loggerhead was resuscitated after capture on an observed *Loligo* haul, and was tagged and released alive. There are no mortality estimates for loggerhead turtles that are attributed to the *Loligo* fishery.

The status quo quota specification of 17,000 mt under alternative 1 is not expected to increase fishing effort or redistribute effort by gear type. As such, the implementation of this quota level (i.e., 17,000 mt) is not expected to impact the protected species described above, and in section 6.4, relative to 2008 specifications for *Loligo.*

Alternative 2 increases the quota by approximately 12% so there could be concern that effort would increase, with concomitant impacts on protected resource species. However, in the last five years (2003-2007) the quota has only been binding once (2005), so increasing the quota may not necessarily lead to higher effort since some other unquantified factor(s) besides the quota (e.g. availability, market demand, weather, etc) appear to be constraining landings. Thus the additional quota will not necessarily lead to additional overall effort. Given this, it is difficult to predict what levels of effort would be observed with a 19,000 mt harvest. If additional effort resulted, protected resources species could experience adverse effects, but given the modest quota increase and the apparent non-quota controls on harvest, impacts are not expected to be more than minimal.

Again because factors other than the quota appear to be limiting landings, it is difficult to predict what effort levels would be observed with Alternative 3 compared to the status quo, i.e. a 23,000mt quota versus a 17,000mt quota. However, all else being equal, a significantly higher quota could lead to unquantifiably higher effort and thus more adverse protected resource impacts. Thus the effects on protected resources species is somewhat uncertain, possibly zero or possibly negative.

7.4.4 Impacts on Human Communities

Annual quota

The specifications under alternative 1 represents the 2008 status quo. As such, it would not be expected to impact the relevant human communities compared to how the fishery was managed in 2008. As the alternative 1 quota (17,000) is below the best available science estimate of a sustainable quota, prosecution of the *Loligo* fishery at this level would likely provide for a long term, sustainable fishery. This, in turn, should provide long term benefits which will positively affect the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 17 and 18 in the long term.

The specifications under alternative 2 represent a 12% increase from the 2008 status quo. As such, it could be expected to provide minor positive short-term impacts for relevant human communities compared to how the fishery was managed in 2008. However, this may not be the case as it appears *Loligo* landings are limted by factors other than the quota since the quota appears to have been binding only once in the last 5 years. As the alternative 2 quota (19,000) is below the best available scientific estimate of a sustainable quota and at the SARC 34 management recommendation, prosecution of the *Loligo* fishery at this level would likely provide for a long term, sustainable fishery. This, in turn, should provide long term benefits which will positively affect the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 17 and 18 in the long term.

The specifications under alternative 3 represent a 35% increase from the 2008 status quo. As such, it could be expected to provide positive short-term impacts for relevant human communities compared to how the fishery was managed in 2008. However, this may not be the case as it appears *Loligo* landings are limted by factors other than the quota since the quota appears to have been binding only once in the last 5 years. As the alternative 3 quota (23,000) is at the best available scientific estimate of a sustainable quota but above the SARC 34 management recommendation, prosecution of the *Loligo* fishery at this level might provide for a long term, sustainable fishery or might lead to stock decline. If it leads to a stock decline it could lead to long term reductions in yield, which will negatively affect the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 17 and 18.

7.5 Research Set-Asides (RSA) Recommendations

Framework Adjustment 1 to the Atlantic Mackerel, Squid and Butterfish FMP established a program in which research projects can be funded through the sale of fish that has been set-aside from the total annual quota. Through the Mid-Atlantic Research Set-Aside (RSA) Program the Council encourages collaborative efforts between the public, research institutions, and government agencies in broadening the scientific base upon which management decisions are made. Reserving a small portion of the annual harvest as research set-aside quota to subsidize the research costs of vessel operations and scientific expertise is considered an important investment in the future of the nation's fisheries.

In addition, the Mid-Atlantic RSA Program assures that research endeavors selected and funded under this program 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 (i.e. DAH). 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.

The Council has recommended that up to 3-percent of the 2009 *Loligo* (570mt for a 19,000mt quota), *Illex* (720mt for a 24,000mt quota), butterfish (15mt for a 500mt quota), and Atlantic mackerel (3,450 mt for a 115,000mt quota) quotas be set-aside to fund projects selected under the 2009 Mid-Atlantic RSA Program. The project selection and award process for the 2009 Mid-Atlantic RSA Program has not concluded and therefore, the research quota awards are not known. If any portion of the research quota is not awarded, NMFS will return any un-awarded set-aside amount to the commercial fishery either through the 2009 MSB specification rulemaking process or through the publication of a separate notice in the *Federal Register* notifying the public of a quota adjustment.

Vessels harvesting research quota in support of approved research projects would be issued exempted fishing permits (EFP) authorizing them to exceed Federal possession limits and to fish during Federal quota closures. MSA requires that interested parties are provided an opportunity to comment on all proposed EFPs. These exemptions are necessary to allow project investigators to recover research expenses as well as adequately compensate fishing industry participants harvesting research quota. Vessels harvesting research quota would operate within all other regulations that govern the commercial fishery, unless otherwise exempted through a separate EFP. Because quota closures may or may not occur during a given fishing year, exemption from these closures will have no additional environmental impact. Exemption from possession limits could result in compensation fishing vessels altering their normal fishing behavior; extending tow duration or fishing longer than they otherwise would for example. However, this slight alteration in fishing behavior will not likely impact the environment beyond that of the commercial fishery operating within the full suite of regulations.

7.5.1 Impacts on Managed Resource and Non-Target Species

The RSA quota is part of the overall quota. If any portion of the 3-precent RSA quota is not awarded to an RSA project, the remainder will be returned to the commercial quota. With the exception of exemptions from possession limits and quota closures, the RSA quota will be harvested in the same manner as the commercial quota. Therefore, it is unlikely that the retention of MSB species under RSA projects would have negative biological impacts on the managed resource and non-target species compared to if the quota had been utilized by the directed fishery, especially since differences in how an RSA project used the quota compared to directed fishery are minor.

7.5.2 Impacts on Habitat

The amount of research quota likely to be used for RSA relative to the overall annual quotas for MSB species is minimal compared to the overall quotas. Therefore, it is unlikely that the retention of MSB species under RSA projects would have negative habitat impacts compared to if the quota had been utilized by the directed fishery, especially since differences in how an RSA project used the quota compared to directed fishery are likely to be relatively minor.

Because all MSB landings count against the overall quota regardless of whether or not an RSA is implemented, the level of fishing effort for these species will not change. In addition it is not expected that the possession limit and quota closure exemptions will redistribute effort or gear type or change the manner in which these fisheries are prosecuted.

7.5.3 Impacts on Endangered and Other Protected Species

Because all MSB landings count against the overall quota regardless of whether or not an RSA is implemented, the RSA program is not expected to change the level of fishing effort for these species.

Vessels harvesting research quota in support of approved research projects would be issued EFPs authorizing them to exceed Federal possession limits and to fish during Federal quota closures. These exemptions are necessary to allow project investigators to recover research expenses as well as adequately compensate fishing industry participants harvesting research quota. Vessels harvesting research quota would operate within all other regulations that govern the commercial fishery, unless otherwise exempted through a separate EFP. Because quota closures may or may not occur during a given fishing year, exemption from these closures will have no additional environmental impact. Exemption from possession limits could result in compensation fishing vessels altering their normal fishing behavior; extending tow duration or fishing longer than they otherwise would for example. However, this slight alteration in fishing behavior is not expected to have any impact on protected resources.

7.5.4 Impacts on Human Communities

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 be obtained otherwise. 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. Given the impacts of using a minimal amount of the quota are spread among the fishery, impacts to vessels are not expected to be substantial. Also, even these losses may be recouped in the long term because the scientific benefits derived from RSA projects could lead to more efficient management of the fisheries.

7.6 Cumulative Impacts of Preferred Alternatives on Identified VECs

The biological, economic and social impacts of the proposed specifications (preferred alternatives) for 2009 action for *Loligo*, *Illex*, Atlantic mackerel, and butterfish are expected to be minimal since they maintain the status quo relative to previous quotas for *Illex*, Atlantic mackerel, and butterfish and only propose a modest increase (12%) for *Loligo* that is not expected to lead to a significant increase in effort. 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 1 (see Executive Summary).

7.6.1 Cumulative Effects

Definition on 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 section 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.

The cumulative impacts of past, present, and future Federal fishery management actions (including the specification recommendations in this document) should generally be positive. The mandates of the MSFCMA, as currently amended by the SFA, and the 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.

Temporal Scope

In terms of past actions for these fisheries, habitat and socioeconomic impacts, the temporal scope of this analysis is primarily focused on actions that have taken place since 1976, when these fisheries began to be managed under the MSFCMA. For endangered and other protected species, the context is largely focused on the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, the analysis considers the period between the effective date of these specifications (January 1, 2009) and 2010, the year in which Amendment 11 is expected to be completed. The temporal scope of this analysis does not extend beyond the implementation of Amendment 11 because the FMP and the issues facing these fisheries may change in ways that can't be predicted or assessed at this time.

Geographic Scope

The geographic scope of the analysis of impacts to fish species and habitat for this action is the range of the fisheries in the Western Atlantic Ocean, as described in the Affected Environment and Environmental Consequences sections of the document. For endangered and protected species the geographic range is the total range of each species. The geographic range for socioeconomic impacts is defined as those fishing communities bordering the range of the fisheries for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish which occur primarily from the U.S.- Canada border to Cape Hatteras, although the management unit includes all the coastal states from Maine to Florida.

Summary of the Past, Present and Reasonably Foreseeable Future Actions

The earliest management actions implemented under this FMP were designed to control the extensive foreign fisheries that existed in US waters prior to the passage of the MSFCMA. These management actions 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 example, reported foreign mackerel 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, squid and butterfish fisheries were restricted by to certain areas or "windows"). Similarly, the foreign catch of *Loligo* was reduced from 21,000 mt in 1976 to 9,355 mt in 1978. By 1982, foreign *Loligo* landings 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. Foreign allocations were reduced from 20,350 mt during 1982-83 to 5,550 mt during 1983-84. The foreign catch of *Loligo* fell below 5,000 mt by 1986, to 2 mt in 1987 and finally to zero in 1990. 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. The domestic fishery for *Illex* increased steadily during the 1980's as foreign fishing was eliminated in the US EEZ. Reported foreign landings 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 of butterfish were slowly phased out by 1987.

Other 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 8. Amendment 9 established multi-year specifications for all four species managed under the FMP (mackerel, butterfish, *Illex* squid (*Illex*), and *Loligo* squid (*Loligo*)) for up to 3 years; extended the moratorium on entry into the *Illex* fishery, without a sunset provision; adopted biological reference points recommended by the Stock Assessment Review Committee (SARC) for *Loligo*; designated essential fish habitat (EFH) for *Loligo* eggs based on best available scientific information; and prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons.

Future actions include developing a stock rebuilding plan for butterfish and general bycatch reduction measures in Amendment 10 and Amendment 11 which will consider: a limited access program for mackerel; the need for annual catch limits and accountability measures for all species, updated EFH designations for all species, gear impacts on *Loligo*-egg EFH and mitigation measures if necessary, and a cap on at-sea processing of mackerel. Finally, the NMFS convened the Atlantic Trawl Gear (ATG) Take Reduction Team (TRT) in 2006 as a result of a 2003 settlement agreement with the Center for Biological Diversity, with the goal of reducing serious injury and mortality (bycatch) of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), white-sided dolphins (*Lagenorhynchus acutus*), and common dolphins (*Delphinus delphis*) in the Mid-Atlantic Mid-water Trawl fishery, which is part of the MSB fishery. There is no timeline within the MMPA requiring the ATGTRT to submit a draft TRP because all the fisheries affected by the ATGTRT are Category II fisheries and none of the stocks under the ATGTRP are strategic at this time. However, NMFS requested that the TRT make the best effort possible to meet the original 11 month obligation to develop a TRP. While unable to agree on whether to develop a TRP within the 11 month timeframe, TRT members did agree that developing a research plan would maintain progress towards reducing the serious injury and mortality of marine mammals in Atlantic trawl fisheries. The finalized consensus strategy, which is not a TRP, was described in previous specifications EAs and can be found, along with other ATGTRT documentation at : http://www.nero.noaa.gov/prot_res/atgtrp/.

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.

Generally 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. 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, the Council recently received a preliminary capacity analysis which indicated that the currently active mackerel fleet appears capable of taking the long term sustainable yield for the fishery. As a result, the Council recently voted to develop a controlled access plan in Amendment 11 to control additional expansion of harvest capacity in the Atlantic mackerel fishery.

Cumulative Effects Analysis

The cumulative impacts of this FMP were last fully addressed in the SEIS for Amendment 9 (see Table 97 in Amendment 9 and associated Cumulative Effects Assessment) and are currently being re-addressed in the SEIS for Amendment 10 which is currently 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 regulatory 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. Three of the four species in the FMP are not overfished. The general impacts have been positive to both the resources and communities that depend on them. For example, limited access and control of fishing effort through implementation of the annual quotas has had a positive impact on non-target species since the current domestic fishery is being prosecuted at much lower levels of fishing effort compared to the historical foreign fishery. The foreign fishery was known to take significant numbers of marine mammals including common dolphin, white sided dolphin and pilot whales. Since the current US fishery is being prosecuted at lower levels compared to the historical foreign fishery, positive benefits have been realized in the form of reduced takes of the marine mammals described in section 6.4 compared to the historical fisheries.

Through development of the FMP and its amendments 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 strived to meet 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 valued economic components (VECs): targeted species, non-targeted species, protected species, habitat, and communities.

7.6.2 Target Fisheries and Managed 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 US management under the Magnuson Act and then were subsequently rebuilt under the FMP and subsequent 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 considered overfished. *Illex* and mackerel have never been designated as overfished since passage of the SFA. In the case of butterfish, the species was designated as overfished in 2005 and the Council is developing a remedial action through the development of Amendment 10 which will outline a stock rebuilding strategy for this stock. The measures taken as part of the annual specifications process in 2008 and proposed for 2009 should contribute to this rebuilding effort (see the discussion on biological impacts of the butterfish alternatives in section 7.0).

The most obvious and immediate impact on the stocks managed under this FMP occurs as a result of fishing mortality. 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 3.0. 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 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 definitions which are consistent with the SFA, and remedial measures as appropriate.

The quotas and other measures under the preferred alternatives for 2009 serve to achieve the objectives of the FMP. The impacts on the environment for each of these alternatives are 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 (i.e., achieve optimum yield). These measures in conjunction with previous actions, including establishment of limited access for the squids and butterfish in Amendment 5, overfishing definitions in Amendment 8, and the extension of the *Illex* moratorium in Amendment 9, help maximize social and economic benefits from these resources for both the industry and the nation. Future actions such as rebuilding the butterfish stock under Amendment 10 and the development of a controlled access plan for the Atlantic mackerel fishery in Amendment 11 should continue to allow the Council to manage these resources such that the objectives of the SFA continue to be met.

7.6.3 Non-target Species

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 substantially increase 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 2009 under the preferred alternatives is expected to substantially promote or result in increased levels of bycatch relative to the status quo because none are expected to substantially increase effort. 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 10, 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*, and creation of an incidental catch allowance for the *Loligo* fishery. All of these measures should result in a reduction in bycatch and discards of non-target species in these fisheries.

7.6.4 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 6.4.

As noted above, none of the management measures for 2009 under the preferred alternatives are expected to promote or result in increased levels of effort relative to the status quo, since the quota specifications under the preferred alternatives are either equal to or only modestly higher (i.e. *Loligo*). 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 6.4, 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 butterfish stock rebuilding measures in Amendment 10 and the controlled access plan for Atlantic mackerel being developed in Amendment 11. All of these actions will control entry of new fishing effort into or reduce current effort in these fisheries. The cumulative effect of the proposed measures for 2009 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.

7.6.5 Essential Fish 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

The Atlantic mackerel fishery primarily uses mid-water trawls. Otter trawls are the principal gear used in the squid and butterfish fisheries. In general, bottom tending mobile gears 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.

The Council analyzed MSB gear impacts on EFH in Amendment 9, which also included measures which address gear impacts on essential fish habitat. To reduce SMB gear impacts on EFH, Amendment 9 prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons.

7.6.6 Human Communities

National Standard 8 requires that management measures take into account the fishing communities. Dr. Bonnie McCay and her associates from Rutgers University were retained by the Council 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. The Amendment 9 FSEIS and the Amendment 10 DSEIS also contain updates of the communities most dependent on the MSB fisheries. 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 2009, in conjunction with the past and future actions described above, will have positive cumulative impacts for the communities which depend on these resources.

7.6.7 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 and IRFA which are appended to 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 future actions are not expected to result in significant cumulative impacts on the biological, physical, and human components of the environment.

These fisheries have been well managed since implementation of the FMP in the early 1980s. With the exception of butterfish, all of the resources managed under this FMP 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 benefit. 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 2009 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 2009.

8.0 APPLICABLE LAW

8.1 Magnuson-Stevens Fishery Conservation and Management Act

This action is being taken in conformance with the Atlantic Mackerel, Squid and Butterfish FMP, which requires that specifications be set for this fishery on an annual basis. Amendment 8 to the FMP established the overfishing definitions which form the basis for the annual specifications. Although Amendment 8 was partially approved in 1999, NOAA Fisheries Service noted that the amendment inadequately addressed some Magnuson-Stevens Act requirements for Federal FMPs. Specifically, Amendment 8 was considered deficient with respect to: Consideration of fishing gear impacts on EFH as they relate to MSB fisheries; designation of EFH for Loligo eggs; and the reduction of bycatch and discarding of target and non-target species in the MSB fisheries. Amendment 9 evaluated fishing gear impacts on EFH and designated EFH for Loligo eggs. Amendment 10 is intended to bring the MSB into compliance with Magnuson-Stevens Act rebuilding and bycatch requirements. The Magnuson-

Stevens Fishery Conservation and Management Reauthorization Act of 2006 will require annual catch limits and accountability measures for Atlantic mackerel and butterfish, and these requirements will be addressed in Amendment 11.

8.1.1 Essential Fish Habitat Assessment

Except for *Loligo*, the quotas under the preferred alternatives proposed in this action maintain the status quo relative to 2008 specifications. For *Loligo*, the Council is proposing a modest increase per guidance from the most recent stock assessment. Since *Loligo* landings are heavily dependent on availability, the modest increase proposed for the *Loligo* quota is not expected to change fishing effort more than minimally in 2009 compared to previous years. Therefore, the Council concluded in section 7.1-7.4 of this document that the 2009 quota specifications proposed for Atlantic mackerel, squid, and butterfish will have no more then minimal adverse impacts on EFH than those that may currently exist. No mitigation of the adverse effects of the 2009 Loligo quota is necessary (because the adverse effects are minimal). The adverse impacts of bottom trawls used in MSB fisheries on other managed species (not MSB), which were determined to be more than minimal and not temporary in Amendment 9, were minimized by the Lydonia and Oceanographer canyon GRAs. Therefore, given the minimal impact of the increased Loligo quota, the adverse habitat impacts of MSB fisheries "continue to be minimized" by the canyon GRAs.

8.2 NEPA

8.2.1 Finding of No Significant Impact (FONSI)

National Oceanic and Atmospheric Administration Administrative Order 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. '1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQs context and intensity criteria. These include:

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

None of the proposed specifications of IOY for 2009 are expected to jeopardize the sustainability of any target species affected by the action (see sections 7.1.1, 7.2.1, 7.3.1, and 7.4.1 of this document). All of the proposed quota specifications under the preferred alternatives for each species are consistent with the FMP overfishing definitions. The overfishing definitions for these species are based primarily on maintaining fishing mortality levels below the levels which are sustainable in the long term (i.e., below a fishing mortality rate which produces maximum sustainable yield). As such, the proposed action will ensure the long-term sustainability of harvests from the Atlantic mackerel, *Illex* and *Loligo* squid, and butterfish stocks.

2) *Can the proposed action reasonably be 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 (see sections 7.1.1, 7.2.1, 7.3.1, and 7.4.1 of this document). The proposed measures maintain or the quota specifications of IOY for the upcoming fishing year for Atlantic mackerel, *Illex* and butterfish and modestly increase the quota specifications of IOY for the upcoming fishing year for *Loligo*. The increase in the *Loligo* quota is not expected to substantially increase effort. Therefore, none of these specifications of are expected to result in substantially increased fishing effort. In addition, none of the measures are expected to substantially alter fishing methods or the temporal and/or spatial distribution of fishing activities. Therefore, none of the proposed actions are expected to jeopardize the sustainability of non-target species relative to the 2008 specifications.

3) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?

The proposed action is not expected to cause damage to the ocean, coastal habitats, and/or EFH as defined under the Magnuson-Stevens Act and identified in the FMP (see sections 7.1.2, 7.2.2, 7.3.2, and 7.4.2 of this document). In general, bottom-tending mobile gear, primarily otter trawls, which are used to harvest mackerel, squid, and butterfish, have the potential to adversely affect EFH for the benthic lifestages of a number of species in the Northeast region that are managed by other FMPs. However, because none of the management measures proposed in this action would cause any substantial increase in fishing effort relative to status quo, they are not expected to have any substantial negative impact on EFH or on coastal and ocean habitats.

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

None of the measures substantially alter the manner in which the industry conducts fishing activities for the target species. Therefore, no changes in fishing behavior that would affect safety are anticipated (see section 7.0 of this document). Overall, the proposed actions in these fisheries, including the communities in which they operate, will not adversely impact public health or safety. NMFS will consider comments received concerning safety and public health issues.

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

The Atlantic mackerel, *Loligo, Illex* and butterfish fisheries are known to interact with common and white sided dolphins and pilot whales. Fishing effort is not expected to substantially increase in magnitude under the proposed specifications of IOY. In addition, none of the proposed specifications of IOY are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort (see sections 7.1.3, 7.2.3, 7.3.3, and 7.4.3 of this document). Therefore, this action is not expected to have increased negative effects on common and white sided dolphin and pilot whales. The Atlantic mackerel, *Illex* and butterfish fisheries are not known to interact with any endangered or threatened species or their critical habitat. The *Loligo* fishery has been known to have interactions with loggerhead and leatherback sea turtles as discussed in section 6.4 and section 7.4.3. The proposed action is not expected to substantially increase fishing effort or substantially alter fishing patterns in a manner that would adversely affect either of these endangered species of sea turtles.

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

These fisheries are prosecuted using bottom otter trawls which have the potential to impact bottom habitats. In addition, a number of non-target species are taken incidentally to the prosecution of these fisheries. However, fishing effort is not expected to substantially increase in magnitude under the proposed specification of IOY action (see section 7.0 of this document). In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort. Therefore, the proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area.

7) Are significant social or economic impacts interrelated with natural or physical environmental effects?

These fisheries are prosecuted using bottom otter trawls which have the potential to impact bottom habitats. In addition, a number of non-target species are taken incidentally to the prosecution of these fisheries. However, fishing effort is not expected to substantially increase in magnitude under the proposed action. In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort. As noted in section 7.0 of the EA, the proposed action is not expected to have any substantial natural or physical effects within the affected area. Therefore, there are no social or economic impacts interrelated with significant natural or physical environmental impacts that are expected.

8) Are the effects on the quality of the human environment likely to be highly controversial?

The impacts of the proposed measures on the human environment are described in section 7.0 of this EA. The proposed action would continue the 2008 IOY specifications for Atlantic mackerel, *Illex* squid, and butterfish in 2009. The proposed action would modestly increase the *Loligo* IOY specification but is not likely to substantially increase effort. As a result, the specifications in 2009 are not expected to be highly controversial. The proposed action is based on measures contained in the FMP which have been in place for many years. In addition, the scientific information upon which the annual quotas are based has been peer reviewed and is the most recent information available. Since the quotas are based on the best information available and many have already in place in previous years, the proposed action is the not expected to be highly controversial.

9) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

The Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries are prosecuted primarily using bottom otter trawls in the open ocean throughout the Mid-Atlantic Bight and New England. Most of the fishing effort in these fisheries occurs over featureless sand and sand/mud bottoms along the Atlantic Coast. These fisheries are not known to be prosecuted in any unique areas such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas. Therefore, the proposed action is not expected to have a substantial impact on any of these areas (see section 7.0 of this document).

10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

This proposed action is not expected to substantially increase effort. In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities. As a result, the effects on the human environment of the proposed specifications for 2009 are expected to be minimal or non-existent compared to the 2008 specifications. The effects on the human environment as a result of implementing the 2009 specifications for these species are not highly uncertain nor do they involve unique or uncertain risks (see section 7.0 of this document).

11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

The impacts of the preferred alternatives on the biological, physical, and human environment are described in section 7.0. 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 benefits from improved fishery efficiency is most likely to affect participants in these fisheries. These benefits are addressed in the RIR/IRFA 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 future actions are not expected to result in significant cumulative impacts on the biological, physical, and human components of the environment.

12) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

The Atlantic mackerel, *Loligo*, *Illex*, and butterfish fisheries are prosecuted primarily using bottom otter trawls in the open ocean throughout the Mid-Atlantic Bight and New England. Most of the fishing effort in these fisheries occurs over featureless sand and sand/mud bottoms along the Atlantic Coast. These fisheries are not known to be prosecuted in any areas that might affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause the loss or destruction of significant scientific, cultural or historical resources (sections 6.0 and 7.0 of this document). Therefore, the proposed action is not expected to affect on any of these areas.

13) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

The Atlantic mackerel, *Loligo*, *Illex*, and butterfish fisheries are prosecuted primarily using bottom otter trawls in the open ocean throughout the Mid-Atlantic Bight and New England. There is no evidence or indication that these fisheries have ever resulted or would result in the introduction or spread of nonindigenous species. Fishing effort is not expected to substantially increase in magnitude under the proposed action. In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort significantly (see section 7.0 of this document). Therefore, it is highly unlikely that the proposed specifications would be expected to result in the introduction or spread of a non-indigenous species.

14) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Fishing effort is not expected to substantially increase in magnitude under the proposed action (see section 7.0 of this document). In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort significantly. Maintaining or modestly increasing the 2008 IOY specifications for 2009 is not likely to establish a new precedent for future actions. When new stock assessment or other biological information about these species becomes available in the future, then the annual specifications will be adjusted according to the overfishing definitions contained in the FMP.

15) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Fishing effort is not expected to substantially increase in magnitude under the proposed action (see section 7.0 of this document). In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort. Thus, it is not expected that they would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment. In fact, the proposed measures have been found to be consistent with other applicable laws (see sections 8.3 - 8.11 below).

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

Fishing effort is not expected to substantially increase in magnitude under the proposed action (see section 7.0 of this document). In addition, none of the proposed specifications are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort. The synergistic interaction of improvements in the efficiency of the fishery through implementation of annual quotas based on the overfishing definitions contained in the FMP 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 benefits from improved fishery efficiency are most likely to affect participants in these fisheries positively in the long term. 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 impacts of the preferred alternatives on the biological, physical, and human environment are described in section 7. The cumulative effects of the proposed action on target and non-target species are detailed in section 7.6 of the EA. The proposed measures are not expected to alter fishing methods or activities, nor substantially increase fishing effort. As such, the proposed actions together with past and future actions are not expected to result in significant cumulative impacts on the biological, physical, and human components of the environment.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for 2009 Atlantic Mackerel, Squid and Butterfish fisheries, it is hereby determined that the proposed specifications for 2009 will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

______________________________	_______________
Northeast Regional Administrator, NOAA	Date

8.3 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 6.4. Four species of marine mammals are known to interact with the Atlantic mackerel, squid and butterfish fisheries - long and short finned pilot whales, common dolphin and white sided dolphin. This action proposes to continue or only modestly increase the commercial quotas and other management measures in 2009 which are already in place for 2008 for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish. None of the specifications are expected to alter fishing methods or activities or result in substantially increased effort. The Council has reviewed the impacts of the proposed specifications for the 2009 Atlantic mackerel, squid and butterfish fisheries on marine mammals and concluded that the management actions proposed are consistent with the provisions of the MMPA and would not alter existing measures to protect the species likely to inhabit the management units of the subject fisheries. For further information on the potential impacts of the fishery and the proposed management action, see section 6.4.

8.4 Endangered Species Act

Section 7 of the ESA requires Federal agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The Council has concluded that the proposed 2009 specifications for Atlantic mackerel, *Illex* and butterfish and the prosecution of the associated fisheries is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries Service jurisdiction, or alter or modify any critical habitat, based on the discussion in this document. For further information on the potential impacts of the fisheries and the proposed management action, see Section 6.4 of this document. NOAA Fisheries Service last completed an informal consultation on April 3, 2008. The previous formal consultation on the MSB fisheries was completed on April 28, 1999, and concluded that the operation of the MSB fisheries was not likely to jeopardize the continued existence of listed species and would not result in the destruction or adverse modification of designated critical habitat. Formal consultation on the MSB fisheries was reinitiated on March 6, 2008, after new information revealed that the MSB fisheries may affect sea turtles to an extent not previously considered.

8.5 Administrative Procedures Act (APA)

Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

8.6 Paperwork Reduction Act (PRA)

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. This action does not propose to modify any existing collections, or to add any new collections; therefore, no review under the PRA is necessary.

8.7 Coastal Zone Management Act

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to the CZMA regulations at 15 CFR 930.35, a negative determination may be made if there are no coastal effects and the subject action: (1) Is identified by a state agency on its list, as described in § 930.34(b), or through case-by-case monitoring of unlisted activities; or (2) which is the same as or is similar to activities for which consistency determinations have been prepared in the past; or (3) for which the Federal agency undertook a thorough consistency assessment and developed initial findings on the coastal effects of the activity. Accordingly, NMFS has determined that this action would have no effect on any coastal use or resources of any state. Letters documenting the NMFS negative determination, along with this document, were sent to the coastal zone management program offices of the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. A list of the specific state contacts and a copy of the letters are available upon request.

8.8 Section 515 (Data Quality Act)

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Data Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following section addresses these requirements.

Utility

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the proposed action is included so that intended users may have a full understanding of the proposed action and its implications.

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Council to propose this action are the result of a multi-stage public process. Thus, the information pertaining to management measures contained in this document has been improved based on comments from the public, the fishing industry, members of the Council, and NOAA Fisheries Service.

The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

Integrity

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NOAA Fisheries Service adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

Objectivity

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries Service observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Atlantic Mackerel, Squid and Butterfish Monitoring Committee.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the proposed action were conducted using information from the most recent complete calendar years, through 2007. The data used in the analyses provide the best available information on the number of seafood dealers operating in the northeast, the number, amount, and value of fish purchases made by these dealers, the number of reports made annually by these dealers, and the types of permits held by these dealers. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to these fisheries.

The policy choices are clearly articulated in section 5.0 of this document as well as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in section 6.0 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the responsible Council, the Northeast Fisheries Science Center, the Northeast Regional Office, and NOAA Fisheries Service Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations is conducted by staff at NOAA Fisheries Service Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

8.9 Regulatory Flexibility Analysis (RFA)

The purpose of the RFA is to reduce the impacts of burdensome regulations and recordkeeping requirements on small businesses. To achieve this goal, the RFA requires Federal agencies to describe and analyze the effects of proposed regulations, and possible alternatives, on small business entities. To this end, this document contains an IRFA, found at section 1.0 at the end of this document, which includes an assessment of the effects that the proposed action and other alternatives are expected to have on small entities.

8.10 E.O. 12866 (Regulatory Planning and Review)

The purpose of E.O 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 2.0 at the end of this document represents the RIR, which includes an assessment of the costs and benefits of the proposed action, in accordance with the guidelines established by E.O. 12866. The analysis included in the RIR shows that this action is not a "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy

8.11 E.O. 13132 (Federalism)

This E.O. established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed for the 2009 quota specifications for Atlantic mackerel, *Loligo* and *Illex*, and butterfish. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council). No comments were received from any state officials relative to any federalism implications that may be associated with this action

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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 within the management unit reviewing the consistency of the proposed action relative to each state's Coastal Zone Management Program: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia and Florida.

11.0 LIST OF PREPARERS AND POINT OF CONTACT

This environmental assessment was prepared by the following members of the MAFMC staff: Richard J. Seagraves and Jason Didden. Questions about this environmental assessment or additional copies may be obtained by contacting Jason Didden, Mid-Atlantic Fishery Management Council, 300 S. New Street, Dover, DE 19904-6790 (302-674-2331). This EA may also be accessed by visiting the NMFS Northeast Region website at www.nero.noaa.gov.

INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA) & REGULATORY IMPACT REVIEW FOR THE 2009 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

1.0 INTRODUCTION

E.O. 12866 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 $34.7 million in 2007. 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 Atlantic mackerel, 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.

For Atlantic mackerel, *Illex*, and butterfish, 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 the 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.

For *Loligo*, Amendment 9 implemented overfishing definitions which are the best available science but resulted in higher quota specifications resulting from these new overfishing definitions. The economic effects of these overfishing definitions and quota specifications were evaluated at the time Amendment 9 was implemented. The economic analysis presented at the time Amendment 9 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 three alternatives considered for Atlantic mackerel specifications for 2009 are fully described in section 5.1 of the EA and are summarized in the table below (Table 47)

Table 47. Proposed specifications for Atlantic mackerel for the 2009 fishing year (mt).

	ABC	IOY	DAH	DAP	JVP	TALFF	Closure Trip Limit (lbs)
Alt. 1	156,000	115,000	115,000	100,000	0	0	20,000
Alt. 2	156,000	115,000	115,000	100,000	0	0	20,000/ 50,000
Alt. 3	156,000	115,000	115,000	100,000	0	0	50,000

Alternative 2 proposes to change the current incidental trip limit during a directed closure (20,000 pounds, i.e. Alternative 1) to 50,000 pounds if the fishery closes after June 1. Alternative 3 proposes to change the current incidental trip limit during a directed closure (20,000 pounds) to 50,000 pounds regardless of the closure date. The intent of these measures is to reduce possible regulatory discarding of mackerel in the Herring fishery should the Atlantic mackerel fishery close. There are typically minimal landings of mackerel after June 1 so substantial revenue increases are unlikely. However, if the herring fishery has to sort out Atlantic mackerel from herring catches there would be a decrease in efficiency, and therefore an increase in costs. Given the mackerel fishery has never closed, it is not possible to quantify the impacts, but industry has communicated to the Council that the costs related to efficiency losses would be substantial. Avoiding such costs would directly benefit the ports and communities that engage in the herring fishery.

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 (IOY) for 2009 is not expected to be constraining, so no change in the domestic harvest of Atlantic mackerel would be expected as a result of the specifications in 2009 under any of the alternatives for IOY considered for Atlantic mackerel. Both the specification of IOY and ABC far exceed recent landings of Atlantic mackerel. If landings begin to approach IOY in 2009, the Regional Administrator can increase OY up to ABC. In the case where an in-season adjustment to IOY is necessary, landings would be expected to increase compared to either recent landings or IOY under all three alternatives considered by the Council.

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 as a result of the 2009 proposed specifications of IOY. In the case where an in-season adjustment to IOY is necessary, landings would be expected to increase compared to either recent landings or the status quo IOY. If landings increased, then the price of Atlantic mackerel has the potential to decrease. However, since the majority of US caught Atlantic mackerel are exported to foreign markets, the impact of increased US landings and exports due to an in-season adjustment on the price of US caught mackerel will depend principally on the state of world demand for mackerel and the world supply of mackerel in 2009. Since US supply of mackerel is very small compared to world supply and demand, it appears unlikely that an increase in US production in mackerel will result in a decrease in price on the world market (and hence the amount received by US producers in the world export market). Rather, it would appear more likely that high world demand and prices would stimulate an increase in US production which would trigger the need for an increase in OY up to ABC through an in-season adjustment

Consumer Surplus

Assuming Atlantic mackerel prices will not be affected under the scenario for IOY constructed above, there will be no corresponding change in consumer surplus associated with these fisheries. If Atlantic mackerel prices decrease because of an increase in landings through an in-season adjustment to IOY, then consumer surplus would be expected to increase. However, it is more likely than an in-season adjustment would occur under the situation where high world demand causes an increase in price for mackerel. In that case, consumer surplus to US consumers would be expected to decrease.

Harvest Costs

No changes to harvest costs relative to the status quo for the MSB fisheries are expected as a result of these measures. However, they could possibly prevent an increase in harvest costs to the herring fishery in the future should the directed mackerel fishery be closed.

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. If Atlantic mackerel prices decrease because of an increase in landings through an in-season adjustment to IOY, then producer surplus would be expected to decrease. However, it is more likely than an in-season adjustment would occur under the situation where high world demand causes an increase in price for mackerel. In that case, producer surplus to US producers would be expected to increase.

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 consumer'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 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 or other species in the MSB FMP.

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. None of the measures are expected to increase enforcement costs.

Distributive Effects

[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 a change in quantity demanded and price are the same.

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

<u>Alternatives for *Illex*</u>

The specifications for *Illex* under alternative 1 (status quo and preferred alternative) would be Max OY, ABC, IOY, DAH, and DAP = 24,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under this 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 2009. On average over the past five years, 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 2009 for *Illex* are expected to result in an increase or decrease in landings in 2009.

Prices

Given the likelihood that the alternatives considered for *Illex* would not affect landings in 2009, 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.

<u>Alternatives for butterfish</u>

The specifications under alternative 1 (status quo and preferred alternative) would be max OY = 12,175 mt, ABC = 1,500 mt, and IOY, DAH, and DAP = 500 mt and JVP and TALFF = 0 mt. The specifications under alternative 2 would be Max OY = 12,175 mt, ABC = 4525 mt, and IOY, DAH, and DAP = 15,861 mt and JVP and TALFF = 0 mt. 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

Alternatives 2 and 3 represent no constraint on butterfish landings compared to recent fishery landings since the Alternative 2 and 3 quota levels are in excess of the average landings over the past three years (2005-2007: 554mt). As such, no change in the domestic harvest of butterfish would be expected as a result of these specifications. Alternative 1 would constrain the butterfish fishery to 500mt, 54mt or 10% less than the recent three year average. At 2007 prices, a 54mt reduction of butterfish translates to $86,500 less ex-vessel revenues. With 309 vessels landing butterfish in 2007, the average lost revenue would be less than $300 annually per vessel. However, since the 2008 specifications included a 500mt quota and were designed to keep the butterfish fishery below 500mt, and will likely do so since the 2008 fishery closed on September 5, 2008, no changes from 2008 to 2009 in terms of fishing opportunities are expected as a result of the 2009 specifications.

Prices

Given the likelihood that the alternatives considered will result in no significant change in butterfish landings in 2009, 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.

Consumer Surplus

Assuming butterfish prices will not be affected under the alternatives considered, there will be no corresponding change in consumer surplus associated with these alternatives.

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 the alternatives considered, there will be no corresponding change in producer surplus associated with these alternatives.

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. None of the alternatives considered are not expected to change enforcement costs.

Distributive Effects

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

Alternatives for *Loligo*

The alternatives considered for *Loligo* squid are fully described in section 5.4. The specifications under alternative 1 (status quo) would be Max OY =26,000 mt, ABC, IOY, DAH, and DAP = 17,000 mt and JVP and TALFF = 0. In terms of the annual quota, these specifications represent the 2008 status quo. The specifications under alternative 2 (preferred) would be Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0. In terms of the annual quota, these specifications represent a modest increase from 2008. The specifications under alternative 3 would be Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 23,000 mt and JVP and TALFF = 0.

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

Alternatives 1-3 for *Loligo* is not expected to result in a change in landings due to the specifications in 2009. On average over the past five years, the landings of *Loligo* have been below the status quo quota level. Therefore, the status quo alternative is not expected to result in an increase or decrease in landings in 2009.

Prices

Given the overall likelihood that the alternatives considered for *Loligo* would not affect landings in 2009, it is assumed that there will not be a change in the price for this species.

Consumer Surplus

Assuming *Loligo* 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 *Loligo*.

Producer surplus

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

Enforcement Costs

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

Distributive Effects

There are no changes to the quota allocation process for *Loligo* under the alternatives considered. As such, no distributional effects are expected 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 is summarized in Table IRFA-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 "-" indicates that the level of the given feature would be reduced given the action as compared to the base year. A "+" 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 2007 landings. This comparison will allow for the evaluation of the potential fishing opportunities associated with each alternative in 2009 versus the fishing opportunities that occurred in 2007. Since the preferred alternative for IOY for each species are similar to the 2007 status quo, each may be expected to have similar overall impacts.

The Council has concluded that no change in the competitive nature of these fisheries should result from implementation of the quota specifications under the preferred alternatives. No changes in enforcement costs or harvest costs have been identified for any of the alternatives considered for each species.

It is important to note that although the measures that are evaluated in this specification package are for the 2009 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 the 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, *Loligo* and *Illex* squid and butterfish in 2009 relative to 2007.

Parameter	Alternatives 1-3 for IOY for Mackerel, *Illex*, *Loligo*, and butterfish	Alternatives 1-3 for ABC for Mackerel (in-season adjustment)
Landings	0, except 0/- for butterfish	+
Prices	0	-/+
Consumer Surplus	0	-/+
Harvest Costs	0	0
Producer Surplus	0	-/+
Enforcement Costs	0	0
Distributive Impacts	0	0

"-" denotes a reduction relative 2007; "0" denotes no change relative 2007; and "+" denotes an increase relative to 2007. "0/" before a "-" or "+" indicates a minor change.

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 $4.0 million.

The measures regarding the 2009 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 NMFS permit file data, 2,462 commercial vessels were holding Atlantic mackerel permits, 383 vessels were holding *Loligo*/butterfish moratorium permits, 78 vessels possessed *Illex* permits, 2108 vessels held incidental catch permits in 2007. In any given year most if not all of these vessels readily fall within the definition of small business. In addition, the 2009 quotas could affect any dealer which holds a federal Atlantic mackerel, squid and butterfish dealer permit. According to 2007 NMFS permit file data, there were 550 dealers which possessed federal Atlantic mackerel, squid and butterfish dealer permits. The IOY specifications under the preferred alternative for Atlantic mackerel, *Loligo* and *lllex* squid represent no constraint on vessels in these fisheries. The level of landings allowed under the preferred alternatives for these fisheries for 2009 have not been achieved by vessels in these fisheries in recent years. Absent such a constraint, no impacts on revenues are expected as a result of the proposed action. For butterfish, Alternative 1 would constrain the butterfish fishery to 500mt, a 54mt or 10% less than the recent three year average. At 2007 prices, 54mt of butterfish translates to $86,500 less ex-vessel revenues. However, since the 2008 specifications were designed to keep the butterfish fishery below 500mt and will likely do so, no change from 2008 to 2009 is expected as a result of the 2009 specifications.

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 2007. 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 2007 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 2007. The second step was to estimate total revenues from all species landed by each vessel during calendar year 2007. This estimate provides the base from which subsequent quota changes and their associated effects on vessel revenues were compared. Since 2007 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 2008 were not used in this analysis because the year is not complete. As such, 2007 data were used as a proxy for 2008.

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 2007 (2008 proxy).

The fourth step was to divide the estimated 2007 revenues from all species by the 2007 base revenues for every vessel in each of the classes. For each quota alternative a summary table was constructed that report 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 is used as a proxy for profits due lack of cost date for individual vessels. In the current analysis, none of the alternatives were judged to have possible disproportionate effects.

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.

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 2-5 below

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Table IRFA-2. Summary of specifications and landings for Atlantic Mackerel (mt).

	2003	2004	2005	2006	2007	2008
ABC[1]	347,000	347,000	335,000	335,000	186,000	156,000
IOY	175,000	170,000	115,000	115,000	115,000	115,000
DAH[2]	175,000	170,000	115,000	115,000	115,000	115,000
DAP	150,000	150,000	100,000	100,000	100,000	100,000
JVP	10,000	5,000	0	0	0	0
TALFF	0	0	0	0	0	0
US Commercial	34,301	54,998	42,213	56,646	25,547	-
US Value (m $)	7.9	13.1	11.0	23.7	6.6	-
US Recreational	770	530	1,033	1,633	882	-
Total US	35,071	55,528	43,246	58,279	26,429	-
Canadian	44,475	53,565	54,279	53,649	50,578	-

[1] ABC = F_{target} - estimated Canadian landings.
[2] Includes recreational allocation of 15,000 mt.

Table IRFA-3. Summary of specifications and landings for *Illex* (mt).

	2003	2004	2005	2006	2007	2008
Max OY	24,000	24,000	24,000	24,000	24,000	24,000
ABC	24,000	24,000	24,000	24,000	24,000	24,000
IOY	24,000	24,000	24,000	24,000	24,000	24,000
DAH	24,000	24,000	24,000	24,000	24,000	24,000
DAP	24,000	24,000	24,000	24,000	24,000	24,000
JVP	0	0	0	0	0	0
TALFF	0	0	0	0	0	0
Landings (mt)	6,391	26,098	12,032	13,944	9,022	-
Value (millions $)	4.0	16.8	8.4	7.9	3.9	-

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

	2003	2004	2005	2006	2007	2008
Max OY	16,000	16,000	12,175	12,175	12,175	12,175
ABC	7,200	7,200	4,525	4,545	4,545	1,500
IOY	5,900	5,900	1,681	1,681	1,681	500
DAH	5,900	5,900	1,681	1,681	1,681	500
DAP	5,900	5,900	1,681	1,681	1,681	500
JVP	0	0	0	0	0	0
TALFF[2]	0	0	0	0	0	0
Landings (mt)	536	537	437	554	671	-
Value (millions $)	0.6	0.7	0.7	0.8	1.1	-

Table IRFA-5. Summary of specifications and landings for *Loligo* (mt).

	2003	2004	2005	2006	2007	2008
Max OY	26,000	26,000	26,000	26,000	26,000	26,000
ABC	17,000	17,000	17,000	17,000	17,000	17,000
IOY	17,000	17,000	17,000	17,000	17,000	17,000
DAH	17,000	17,000	17,000	17,000	17,000	17,000
DAP	17,000	17,000	17,000	17,000	17,000	17,000
JVP	0	0	0	0	0	0
TALFF	0	0	0	0	0	0
Landings (mt)	11,935	15,447	16,984	15,880	12,342	-
Value (millions $)	19.9	25.7	28.9	27.8	23.2	-

3.2.1 Impacts of Alternatives for Atlantic mackerel

The three alternatives considered for Atlantic mackerel specifications for 2009 are fully described in section 5.1 of the EA and are summarized in the table below.

Proposed specifications for Atlantic mackerel for the 2009 fishing year (mt):

	ABC	IOY	DAH	DAP	JVP	TALFF
Alt. 1	156,000	115,000	115,000	100,000	0	0
Alt. 2	156,000	115,000	115,000	100,000	0	0
Alt. 3	156,000	115,000	115,000	100,000	0	0

In every case, the alternatives considered for Atlantic mackerel for the 2009 specifications of IOY exceed landings of the species for 2007. Therefore, the 2009 quota specifications considered for the Atlantic mackerel fishery represent no constraint on vessels in the fishery in aggregate or individually. Therefore, specification of the 2009 IOY alternatives would represent no constraint on vessels in the fishery in aggregate or individually. In summary, in the absence of any constraints on vessels in the mackerel fishery in aggregate or individually, there is no impact 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 2009.

3.2.2 Impacts of Alternatives for *Illex*

The specifications for *Illex* under alternative 1 (status quo and preferred alternative) would be Max OY, ABC, IOY, DAH, and DAP = 24,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under this 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 this 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 2009 specifications of IOY exceed landings of the species in 2007 and in most years prior to 2004. Therefore, the 2009 quota specifications considered for the *Illex* fishery represent no constraint on vessels in the fishery in aggregate or individually when compared to average landings over the past five years. Therefore, specification of the 2009 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 2009.

3.2.3 Impacts of Alternatives for butterfish

The specifications under alternative 1 would be max OY = 12,175 mt, ABC = 1,500 mt, and IOY, DAH, and DAP = 500 mt and JVP and TALFF = 0 mt. The specifications under alternative 2 would be Max OY = 16,000 mt, ABC = 4,525 mt, and IOY, DAH, and DAP = 1,861 mt and JVP and TALFF = 0 mt. 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 ABC specifications for butterfish under alternatives 2-3 exceed the landings of the species in recent years. Therefore, the 2009 quota specifications under alternatives 2-3 would represent no substantial 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. The ABC specifications under alternative 1 could lead to a small constraint compared to how the fishery operated 2005-2007. Alternative 1 would constrain the butterfish fishery to 500mt, i.e. 54mt or 10% less than the recent three year average. Given the small constraint (10%), the incidental nature of butterfish landings, and the relatively low value of the butterfish fishery, effects are not expected to be substantial in aggregate or individually (four vessels would be predicted to have revenue losses of 1.0%-1.7%, any others less than 1%). At 2007 prices, a reduction of 54mt of butterfish landings translates to $86,500 less ex-vessel revenues. With 309 vessels landing butterfish in 2007, the average lost revenue would be less than $300 annually per vessel. However, since the 2008 specifications included a 500mt quota and were designed to keep the butterfish fishery below 500mt, and will likely do so since the 2008 fishery closed on September 5, 2008, no changes from 2008 to 2009 in terms of fishing opportunities are expected as a result of the 2009 specifications. As a total result, the specifications under alternatives 1-3 will have no substantial negative impacts on businesses involved in the commercial harvest of this species.

3.2.4 Impacts of Alternatives for *Loligo*

The alternatives considered for *Loligo* squid are fully described in section 5.4. The specifications under all three alternatives would be Max OY =26,000 mt, ABC, IOY, DAH, and DAP = 17,000 mt and JVP and TALFF = 0 mt. In terms of the annual quota, these specifications represent the 2007 status quo (no action - status quo).

The ABC specifications *Loligo* under alternatives 1-3 exceed the landings of the species in recent years. Therefore, the 2009 quota specifications under alternatives 1- 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 1-3 will have no negative impacts on businesses involved in the commercial harvest of this species.