UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

JAN 4 2011

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: 2011 Atlantic Mackerel, Squid, and Butterfish Specifications Environmental Assessment (EA)

LOCATION: Atlantic Exclusive Economic Zone

SUMMARY: This action implements 2011 specifications and management measures for Atlantic mackerel, squid (*Loligo* and *Illex*), and butterfish (MSB), and modifies existing management measures. This action implements specifications that are the same as those implemented in 2010 for butterfish. The allowable biological catch (ABC) and initial optimal yield (IOY) are reduced for mackerel, and the IOY is reduced for *Illex* squid. Finally, the ABC and IOY are increased for *Loligo* squid. This action also modifies the accounting procedures for quota underages, and revises the 72-hr pre-trip notification requirement for the *Loligo* fishery to accommodate vessels departing for multiple day trips in a week. These specifications and management measures promote the utilization and conservation of the MSB resource.

RESPONSIBLE OFFICIAL: Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
National Oceanic and Atmospheric Administration (NOAA)
55 Great Republic Drive, Gloucester, MA, 01930
(978) 281-9315

The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, an environmental impact statement was not prepared. A copy of the Finding of No Significant Impact (FONSI), including the supporting environmental assessment, is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI, we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the Responsible Official named above.

Sincerely,

for Paul N. Doremus, Ph.D.
NOAA NEPA Coordinator

Enclosure

2.0 LIST OF ACRONYMS

AA	Assistant Administrator
ABC	Allowable Biological Catch or Acceptable Biological Catch
ACFCMA	Atlantic Coastal Fisheries Cooperative Management Act
ACL	Annual Catch Limit
ACT	Annual Catch Target
AFS	American Fisheries Society
AM	Accountability Measure
APA	Administrative Procedures Act
AR	auto-regressive
ASMFC	Atlantic States Marine Fisheries Commission or Commission
ATGTRP	Atlantic Trawl Gear Take Reduction Plan
ATGTRT	Atlantic Trawl Gear Take Reduction Team
B	Biomass
BMSY	Biomass Associated with Maximum Sustainable Yield
BRP	Biological reference points
CAFSAC	Canadian Atlantic Fisheries Scientific Advisory Committee
CD	Confidential data
CDP	Census Designated Place
CEA	Cumulative Effects Assessment
CEQ	Council on Environmental Quality
CETAP	Cetacean and Turtle Assessment Program
CFR	Code of Federal Regulations
CI	Confidential Information
CPUE	Catch Per Unit Effort
CV	coefficient of variation
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DMF	Department of Maine Fisheries
DOC	Department of Commerce
DOL	Department of Labor
DPS	Distinct Population Segment
DSEIS	Draft Supplementary Environmental Impact Statement
DWF	Department of Wildlife and Fisheries
EA	Environmental Assessment
EAP	Emergency Action Plan
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ELMR	Estuarine Living Marine Resources
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973

F	Fishing Mortality Rate
FAO	U.N. Food and Agriculture Organization
FMAT	Fishery Management Action Team
FMAX	Threshold Fishing Mortality Rate
FMP	Fishery Management Plan
FMSY	Fishing Mortality Associated with MSY
FR	Federal Register
FSEIS	Final Supplementary Environmental Impact Statement
FTARGET	Target Fishing Mortality Rate
FWS	U.S. Fish and Wildlife Service
GAMS	general additive models
GB	George's Bank
GC	General Counsel or General Category (Scallop)
GOM	Gulf of Maine
GRA	Gear Restricted Area
HAPC	Habitat Area of Particular Concern
HPTRP	Harbor Porpoise Take Reduction Plan
ICES	International Council for the Exploration of the Sea
ICNAF	International Convention of the Northwest Atlantic Fisheries
IMPLAN	IMpact Analysis for PLANning
IRFA	Initial Regulatory Flexibility Analysis
IOY	Initial Optimum Yield
IQA	Information Quality Act
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual Transferrable Quota
IUCN	International Union for Conservation of Nature
JV	Joint Venture
LNG	Liquefied Natural Gas
LOF	List of Fisheries
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
MRIP	Marine Recreational Information Program
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSB	Atlantic Mackerel, Squid, Butterfish (Consistent with the relevant plan's name)
MSY	Maximum Sustainable Yield
MT (or mt)	metric tons
NAFO	Northwest Atlantic Fisheries Organization
NAO	National Oceanic and Atmospheric Administration Order
NASUS	National Academy of Sciences of the United States
NE	New England
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fishery Observer Program

NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NIOZ	Royal Netherlands Institute for Sea Research
NK	Not classified
NLDC	New London Development Corporation
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOS	National Ocean Service
NSF	National Science Foundation
OBSCON	Observer Contract
OSP	optimum sustainable population
OTA	Office of Technology Assessment
OY	Optimal Yield
PBR	Potential Biological Removal
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PSE	Proportional Standard Error
RFA	Regulatory Flexibility Act
RFF	reasonably foreseeable future
RFFA	Reasonably Foreseeable Future Actions
RIR	Regulatory Impact Review
RSA	Research Set-Aside
RV	Research Vessel
SA	South Atlantic
SAFE	Stock Assessment and Fishery Evaluation
SAFIS	Standard Atlantic Fisheries Information System
SAR	Stock Assessment Report
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SBA	Small Business Administration
SBRM	Standardized Bycatch Reporting Methodology
SD	Standard Deviation
SEFSC	Southeast Fisheries Science Center
SEIS	Supplementary Environmental Impact Statement
SF	Sustainable Fisheries
SFA	Sustainable Fisheries Act
SMB	Squid, Mackerel, and Butterfish (Consistent with the relevant committee's name)
SP	Species
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
STAT	Statistical
TAL	Total Allowable Landings
TALFF	Total allowable level of foreign fishing
TEWG	Turtle Expert Working Group

TL	Total Length
TRAC	Transboundary Resource Assessment Committee
TSR	TRAC Summary Report
TRP	Take Reduction Plan
TRT	Take Reduction Team
URI	University of Rhode Island
US	United States
USA	United States of America
USCG	United States Coast Guard
USDC	U.S. Department of Commerce
USDI	U.S. Department of the Interior
USGS	Untied Stated Geological Survey
USSR	Union of Soviet Socialist Republics
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring System
VPA	Virtual Population Analysis
VTR	Vessel Trip Report
WNA	Western North Atlantic
WP	Working Paper
ZMRG	Zero Mortality Rate Goal

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4.0 INTRODUCTION AND BACKGROUND

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 specifications that translate into "hard quotas" based principally on National Standard One (NS1), which requires that fishing mortality rates not exceed guidelines established in the MSA.

Related to the new NS1 guidelines, the Council is currently considering Annual Catch Limits (ACLs) and Accountability Measures (AMs) via an Omnibus ACL/AM Amendment that will likely be implemented in early 2011. This timeline does not allow "ACLs" and "AMs" to be implemented for 2011 MSB specifications. However, the existing specification framework does utilize fishing level recommendations from the MAFMC SSC as upper bounds, set in the form of acceptable biological catches (ABCs) that account for scientific uncertainty such that overfishing is unlikely to occur. The 2012 specifications will utilize the ACL/AM Omnibus framework for annual specifications. In addition, the proposed IOYs are all less than the ABCs to account for discards and/or management uncertainty. The proposed management measures also contain a variety of proactive measures to constrain catch such that IOYs are unlikely to be exceeded in order to minimize management uncertainty. The Council also considered that IOY specifications can be additionally reduced to account for social, economic, and/or ecological needs (including forage needs).

Given all MSB species are managed with hard quotas based on ABCs recommended by the Council's Scientific and Statistical Committee (SSC), and given current measures include proactive accountability measures that activate below ABC levels, the MSB FMP arguably already meets the spirit if not the letter of the new National Standard One guidelines and any deficiencies (e.g. mandatory paybacks) will be corrected through the Omnibus Amendment, which is Amendment 13 to the MSB FMP.

The Council's SSC met May 11-12, 2010 in Baltimore MD and recommended all of the ABCs that are included in the preferred alternatives considered in this document. The Atlantic Mackerel, Squid and Butterfish Monitoring Committee met on May 13, 2010 and reviewed the SSC and MAFMC staff recommendations for the 2011 specifications and management recommendations. The Monitoring Committee began with the SSC's ABC recommendations and then considered additional reductions to account for management uncertainty.

The Council considered the SSC's and Monitoring Committee's recommendations for specifications for all four species in the FMP at its June 2010 meeting in New York, NY and all harvest specifications in the preferred alternatives are below the fishing level recommendations (i.e. ABC) of the SSC to account for discards and/or other management uncertainty. This document serves as the submission to NMFS of the Council's recommendations for 2011 MSB specifications and 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).

Wording conventions - All acronyms used in this document should be listed in Section 2.0, List of Acronyms. Several critical acronyms and/or abbreviations are noted below. The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in United States federal waters. The Act was first enacted in 1976 and amended in 1996 (via the Sustainable Fisheries Act - "SFA") and in 2007 (via the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 - "MSRA"). In this document, the abbreviation "MSA" refers to the Magnuson-Stevens Fishery Conservation and Management Act as currently amended. Also, hereafter "mackerel" refers to "Atlantic mackerel."

4.1 Purpose of and Need for the Action

The purpose of this action is to establish annual specifications and other measures that will meet the need to prevent overfishing and 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 as reduced by relevant economic, social, or ecological factors. Failure to implement the preferred measures described in this document could result in overfishing, stock depletion, and lower overall benefits to the Nation.

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., 2011).

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.

Related to these objectives, the Council has over time instituted a variety of management measures over the years, which are summarized in Table 2.

Table 2. History of the Atlantic Mackerel, Squid and Butterfish FMP

History of the Atlantic Mackerel, Squid and Butterfish FMP		
Year	**Document**	**Management Action**
1978-1980	Original FMPs (3) and individual amendments	Established and continued management of Atlantic mackerel, squid, and butterfish fisheries
1983	Merged FMP	Consolidated management of Atlantic mackerel, squid, and butterfish fisheries under a single FMP
1984	Amendment 1	Implemented squid OY adjustment mechanism
		Revised Atlantic mackerel mortality rate
1986	Amendment 2	Equated fishing year with calendar year
		Revised squid bycatch TALFF allowances
		Implemented framework adjustment process
		Converted expiration of fishing permits from indefinite to annual
1991	Amendment 3	Established overfishing definitions for all four species
1991	Amendment 4	Limited the activity of directed foreign fishing and joint venture transfers to foreign vessels
		Allowed for specification of OY for Atlantic mackerel for up to three years
1996	Amendment 5	Adjusted *Loligo* MSY; established 1 7/8" minimum mesh size
		Eliminated directed foreign fisheries for *Loligo*, *Illex*, and butterfish
		Instituted a dealer and vessel reporting system; Instituted operator permitting
		Implemented a limited access system for *Loligo*, *Illex* and butterfish
		Expanded management unit to include all Atlantic mackerel, *Loligo*, *Illex*, and butterfish under U.S. jurisdiction.
1997	Amendment 6	Established directed fishery closure at 95% of DAH for *Loligo*, *Illex* and butterfish with post-closure trip limits for each species
		Established a mechanism for seasonal management of the *Illex* fishery to improve the yield-per recruit
		Revised the overfishing definitions for *Loligo*, *Illex* and butterfish
1997	Amendment 7	Established consistency among FMPs in the NE region of the U.S. relative to vessel permitting, replacement and upgrade criteria
1998	Amendment 8	Brought the FMP into compliance with new and revised National Standards and other required provisions of the Sustainable Fisheries Act.
		Added a framework adjustment procedure.
2001	Framework 1	Established research set-asides (RSAs).

Year	Document	Management Action (Table 2 Continued)
2002	Framework 2	Established that previous year specifications apply when specifications for the management unit are not published prior to the start of the fishing year (excluding TALFF specifications)
		Extended the *Illex* moratorium for one year; Established *Illex* seasonal exemption from *Loligo* minimum mesh;
		Specified the *Loligo* control rule; Allowed *Loligo* specs to be set for up to 3 years
2003	Framework 3	Extended the moratorium on entry to the *Illex* fishery for an additional year
2004	Framework 4	Extended the moratorium on entry to the *Illex* fishery for an additional 5 years
2009	Amendment 9	Extended the moratorium on entry into the *Illex* fishery, without a sunset provision
		Adopted biological reference points for *Loligo* recommended by the stock assessment review committee (SARC).
		Designated EFH for *Loligo* eggs based on available information
		Prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons
		Authorized specifications to be set for all four MSB species for up to 3 years
2010	Amendment 10	Implemented a butterfish rebuilding program.
		Increased the *Loligo* minimum mesh in Trimesters 1 and 3.
		Implemented a 72-hour trip notification requirement for the *Loligo* fishery.

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5.0 MANAGEMENT ALTERNATIVES

Introduction

The alternatives were selected based on an evaluation of a range of specifications that stem from current or historical biologically based reference points and various assumptions about stock status and/or management uncertainty. The specifications recommended by the Council under the preferred alternatives are based on the target control rules specified in the FMP, the SSC's ABC recommendations (http://www.mafmc.org/fmp/msb.htm), the Monitoring Committee's recommendations (http://www.mafmc.org/fmp/msb.htm), consideration of economic, social, and ecological factors (including forage needs), and public comment at the June Council meeting.

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. Due to a lack of accepted assessments, only *Loligo* currently has viable control rules. The SSC examined the best available scientific information to determine ABCs for all species (see Appendix A).

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 specifications before the start of the new fishing year, then the previous years' specifications shall remain in effect.

5.1 Alternative Set 1: Alternatives for Atlantic mackerel

Changes to measures other than ABC, IOY, DAH, and DAP were not considered because no issues with those other measures have been reported. Thus all alternatives maintain that the directed fishery for mackerel closes when 90% of ABC is projected to be taken and incidental trip limits are then implemented for the remainder of the fishing year (20,000 pounds if the fishery closes before June 1 and 50,000 pounds if the fishery closes on/after June 1). Also, up to 3% of the IOY for mackerel may be set aside for scientific research.

The SSC recommended that the catch limit recommendations from the 2010 mackerel Transboundary Resource Assessment Committee (TRAC) be utilized as a fishery-wide ABC of 80,000mt (combined for the U.S. and Canadian fisheries). There is a range of U.S. ABC's considered in this environmental assessment based on the status quo, the SSC 80,000 mt recommendation, and differing assumptions about 2011 Canadian catch.

In recent years the specification of ABC for mackerel has accounted for Canadian catch in the following manner: U.S. ABC = (Yield at Ftarget) - (expected Canadian catch). Since there are no Yield at Ftarget calculations available from the most recent assessment, the SSC adopted the

TRAC recommendation as a proxy. Thus the starting number was 80,000 mt. Canadian landings are then subtracted from the 80,000 mt. Several approaches for predicting Canadian landings were examined, which are described in greater detail in the individual alternatives.

The 2010 TRAC assessment also estimated U.S. discards 1989-2008. For the most recent 5 years where discard estimates are available, 2004-2008, total discards accounted for 1.3 percent of total catch. This information is used in Alternatives 1a and 1c to account for discards (it is assumed that discards equal 1.3 percent of total catch). Since no information on Canadian discards is available the 1.3 percent discard rate is assumed for Canadian catch as well. Appendix B provides additional information on how "expected Canadian catch" was determined.

5.1.a Alternative 1a for Atlantic mackerel (intermediately restrictive, preferred)

The specifications under this alternative would be ABC = 47,395 mt (Yield of 80,000 mt - 32,605 mt for Canada = 47,395 MT), IOY=46,779 mt (ABC - 1.3% for discards), DAH =46,779 mt, DAP=31,779 mt and JVP=0 and TALFF=0 mt (the DAH specification includes a soft allocation of 15,000 mt to the recreational fishery as per the FMP). IOY is reduced from ABC to account for discards per the latest assessment. The expected Canadian catch (32,605mt) was derived by examining the relationship between U.S. landings in one year (1994-2008) and the Canadian landings in the next year (1995-2009) and is described in more detail in Appendix B. These two landings series were found to be strongly correlated (correlation coefficient = 0.86) but in terms of scale the Canadian landings in each pair (e.g. 2005 U.S. and 2006 Canada) are typically higher, averaging 1.71 times higher over the time series. The 95th percentile of the ratios of the landings pairs was Canadian landings higher by 3.2181 times U.S. landings. In only 1 out of 15 years would multiplying one year's U.S. catch by 3.22 result in an underestimate of Canadian catch the following year. U.S. landings as of 7/1/2010 were approximately 9,744 mt. From 2004-2009 the amount of U.S. landings that occurred after 7/1/2010 averaged 1.3%. Taking this into account, total U.S. landings should be about 9,872 mt, or about 10,000 mt. 10,000 times 3.2181 equals 32,181 mt in Canadian landings, or accounting for discards (1.3%) 32,605 mt. In summary: data since 1994 suggest that only in 1 out of 15 years would one expect 2011 Canadian catch to be above 32,605 mt. Other management measures would not change. (The reader may note that 1.3% is used twice in the above calculations. The discard rate and the post July 1 landings rates were coincidentally 1.3%).

5.1.b Alternative 1b for Atlantic mackerel (status quo, no action, and least restrictive)

The specifications under this alternative would be ABC = 156,000 mt (Yield of 211,000 mt - 55,000 mt for Canada = 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 a soft allocation of 15,000 mt to the recreational fishery as per the FMP). The expected Canadian catch (55,000mt) is assumed to be the highest of the most recent five years of Canadian landings rounded up to the nearest 1,000 mt, which is 55,000 MT (2005). These status-quo specifications were based on projections from SARC 42 (2006), which were deemed inappropriate in the 2010 Transboundary Resource Assessment Committee (TRAC) assessment. Implicit in this alternative was 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). Since

such an increase would not be warranted given the current assessment results, potential impacts related to this theoretical adjustment/increase are not discussed further in this document. Previous specifications have discussed the impacts of the potential adjustment/increase if the reader would like more information. Other management measures would not change.

5.1.c Alternative 1c for Atlantic mackerel (most restrictive)

The specifications under this alternative would be ABC = 38,444 mt (Yield of 80,000 mt - 41,556 mt for Canada = 38,444 MT), IOY=DAH=37,944 mt, DAP=22,944 mt and JVP=0 and TALFF=0 mt (the DAH specification includes a soft allocation of 15,000 mt to the recreational fishery as per the FMP). IOY is reduced from ABC to account for discards per the latest assessment. The expected Canadian catch (41,556mt) was derived by examining the relationship between Canadian landings in one year (e.g. 1994) and the Canadian landings two years later (e.g. 1996) since for estimating 2011 Canadian landings we only have 2009 data currently (described in more detail in Appendix B). The years examined included 1962-2009. These two landings series were found to be strongly correlated (correlation coefficient = 0.71) thus usable in terms of predicting 2011 Canadian landings based on 2009 Canadian landings. 2009 Canadian landings were 41,016 or accounting for discards (1.3%) 41,556mt total caught. Since 1994 this method would overestimate Canadian catch half of the time and underestimate Canadian catch half of the time. Other management measures would not change.

5.2 Alternative Set 2: Alternatives for *Illex*

Changes to measures other than Max OY/ABC/IOY/DAH/DAP were not considered because no issues with those other measures have been reported. Thus all alternatives maintain that the directed fishery for *Illex* closes when 95% of ABC is projected to be taken 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 IOY for *Illex* may be set aside for scientific research.

The SSC recommended an ABC of 24,000 mt. This recommendation was not based on an assessment finding since no accepted assessments are available. The recommendation was based on the observation that landings in the range of 24,000 - 26,000 mt have apparently not caused harm to the *Illex* stock based on examining the catch and survey trends.

For this environmental assessment, there was insufficient information to support any other ABC than 24,000 mt, which was the ABC recommended by the SSC. ABC's higher than the SSC recommendation would not be legal given the MSA requirement for catches not to exceed the ABC recommendations of the SSC. There is no evidence that the *Illex* stock would be harmed by catches of 24,000mt so lower ABCs are not justifiable. Using recent landings to expand the range was considered, but given inter-annual variability, recent years landings may not be useful for determining what future catches should be. There is considerable uncertainty around the discard estimate, though discards appears to be relatively low. To create a reasonable range, and as a precautionary approach, alternative 2c doubled the discard rate derived from the last assessment and deducted accordingly to derive IOY/DAH/DAP.

5.2.a Alternative 2a for *Illex* (preferred, intermediately restrictive)

The specifications under this alternative would be ABC=24,000 mt and IOY=DAH=DAP= 23,328mt and JVP and TALFF = 0 mt. The SSC recommended an ABC of 24,000 based on observations that catches in this range and up to 26,000 mt have not apparently caused harm to the stock. IOY is reduced to account for discards (2.8 % of catch) based on the discard estimate ratios from the last assessment (highly uncertain).

5.2.b Alternative 2b for *Illex* (status quo, no action, least restrictive)

The specifications under this status-quo alternative would be Max OY=ABC= IOY=DAH=DAP=24,000 mt and JVP and TALFF = 0 mt. The rationale for these amounts last year was results from an old assessment that is no longer considered acceptable for management.

5.2.c Alternative 2c for *Illex* (most restrictive)

The specifications under this alternative would be ABC= 24,000 mt and IOY=DAH= DAP= 22,656 mt and JVP and TALFF = 0 mt. The SSC recommended an ABC of 24,000 based on observations that catches in this range and up to 26,000 mt have not apparently caused harm to the stock. IOY is reduced to account for discards (5.6 % of catch) based on double the discard ratio estimates from the last assessment (highly uncertain).

5.3 Alternative Set 3: Alternatives for Butterfish

Changes to measures other than Max OY/ABC/IOY/DAH/DAP were not considered because no issues with those other measures have been reported. 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 trip limits are 600 pounds, reduced to 250 pound if the directed fishery closes before Oct 1. Also, Up to 3% of the IOY for butterfish may be set aside for scientific research (either as butterfish landings or to cover butterfish discards in *Loligo* RSA fishing).

The SSC recommended maintaining status quo ABC levels (1,500 mt) at this time. The 2010 butterfish assessment suggested that abundance trends are in decline and at historically low levels, however F appears very low so environmental conditions appear to be negatively impacting the stock.

Specifications less than or greater than the status quo ABC were not considered because there would be insufficient rationale for such changes given the available information. ABC specifications above 1,500 mt would not be legal given the MSA requirement for catches not to exceed the ABC recommendations of the SSC. Specifications below 1,500 would not be justifiable because the recent assessment suggested that an ABC specification of 1,500 mt would likely constitute an insignificant source of mortality, i.e. the 1,500 mt ABC is already quite low and is designed to keep butterfish mortality low until more favorable environmental conditions facilitate the growth of the butterfish stock. Unlike *Illex*, it did not make sense to create a range with different IOYs/DAH's. Decreasing the DAH will likely just increase discards, not lower total catch because so much of butterfish landings are incidental. Increasing DAH could increase directing though and thus increase the probability of an ABC overage because landings plus discards would be more likely to exceed the ABC (the 2010 butterfish assessment suggested that recently discards have been roughly double landings). The preferred alternative removes the specification of MaxOY, which is no longer supported by the available science.

5.3.a Alternative 3a for butterfish (preferred alternative)

The specifications under this alternative would be ABC = 1,500 mt, and IOY=DAH=DAP=500 mt and JVP and TALFF = 0 mt. These specifications, which acknowledge discards have recently been approximately double landings (per the latest stock assessment), are designed to minimize directed fishing and provide for retention of some incidental catch while the butterfish mortality cap on the *Loligo* fishery (implemented via Amendment 10) constrains discards. These specifications are also generally designed to avoid re-development of a directed fishery while butterfish appears to be in a depleted condition.

5.3.b Alternative 3b for butterfish (status quo and no action)

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. These specifications, which assume discards are double landings (per the latest stock assessment), were designed to minimize directed fishing while Amendment 10 was implemented (to rebuild butterfish). An ABC of 1,500 mt was shown to facilitate rebuilding in just one year given average recruitment levels. These specifications are also generally designed to avoid re-development of a directed fishery while a rebuilding plan was implemented.

5.4 Alternative Set 4: Alternatives for *Loligo* squid - Specifications and associated measures

MSY, B_{MSY} and F_{MSY} form the basis for definitions of overfishing relative to biological reference points. Amendment 9 to the MSB FMP implemented revised proxies for calculating fishing mortality thresholds and targets as recommended by SARC 34 (2002) to keep current with the best available science. 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 appeared fairly resilient (1987 - 2000). The revised proxies are calculated as follows: FTarget is the mean of fishing mortality rates during 1987 - 2000 and FThreshold is the 75^{th} percentile of fishing mortality rates during the same period. The SSC adopted the Fthreshold for a Max OY of 32,000 mt, and recommended that 75% of that value, 24,000 mt be used for an ABC.

There is a range of ABC's considered in this Environmental Assessment. The status quo, 19,000 mt forms a lower bound and the SSC's recommendation for 2011, 24,000 mt forms an upper bound. Since the SSC's recommendation of 24,000 considers the best available science, no other ABCs were considered. There is a range of IOY/DAH/DAP's considered based on different considerations for discards and management uncertainty.

Under all alternatives DAH will be allocated by trimesters into trimester quotas: January-April (43%), May-August (17%) and September-December (40%). In Trimesters 1 and 2, when 90% of the trimester quota is projected to be landed, a 2,500 pound trip limit will be implemented. In Trimester 3, when 95% of the annual DAH has been taken (i.e., 19,000 mt), a 2,500 pound trip limit will be implemented. Vessels with *Loligo* incidental permits may land up to 2,500 pounds per trip at all times. These measures represent the status quo.

The preferred alternative (4a) and 4c also differ from the status quo in that there is a limit on how much *Loligo* trimester quota can be transferred from Trimester 1 to Trimester 2 such that the Trimester 2 quota can only be increased by 50% at most. Currently if Trimester 1 quota underages are more than 25%, the rollover is split equally between Trimesters 2 and 3 which could lead to a relatively large transfer to Trimester 2, and the proposed change would limit the increase to 50% to reduce management uncertainty. Allowing more than a 50% increase in the Trimester 2 quota increases management uncertainty because of the low observer coverage in Trimester 2 and because the cap does not operate during Trimester 2. If additional (beyond 50%) quota is available in Trimester 2 when the cap can not close the fishery, the mortality cap may not function as designed so as to limit overall butterfish mortality.

This document notes that Amendment 10's butterfish mortality cap on the *Loligo* fishery will commence in 2011 and may close the *Loligo* fishery depending on the amount of butterfish caught by *Loligo* vessels. The butterfish mortality cap will operate in parallel to the tracking of the butterfish DAH, which will operate the same as in previous years. Thus the *Loligo* fishery may close because it reaches either its *Loligo* trimester quota or the butterfish cap. Butterfish trip limits may be lowered when 80% of the butterfish DAH is projected to be reached, as presently occurs.

5.4.a Alternative 4a for *Loligo* (preferred, intermediately restrictive)

Under this alternative Max OY =32,000 mt, ABC = 24,000, and IOY=DAH=DAP = 20,000 mt, and JVP and TALFF = 0 mt. The ABC is based on the recommendation of the SSC and the latest stock assessment, SAW/ SARC 34 (2002) and the IOY is reduced to account for discards and additional management uncertainty (higher *Loligo* quotas and more rapid landings may make butterfish bycatch estimates more volatile). Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 8,600mt; Trimester 2: 3,400mt; and Trimester 3: 8,000mt. Trimester 1 underages would be split between Trimester 2 and 3 (50%-50%) if the Trimester 1 underage is greater than 25% but could only increase Trimester 2 quotas by a maximum of 50% (excess would be rolled into Trimester 3). If the Trimester 1 underage is less than 25% of the Trimester 1 quota then the underage is applied to Trimester 3 (as is currently done), avoiding potentially small transfers that could lead to unfeasibly short season openings/closures in Trimester 2. Trimester 1 overages, if any, should be small and would still be applied to Trimester 3. Trimester 2 underages or overages would still be applied to Trimester 3. As a result of both the inherent data processing time lag and late dealer reporting in the dealer reporting program, NMFS has indicated that it would not be possible to make the underage calculation and announce a Trimester 2 quota adjustment until up to two months after Trimester 1 ends.

Up to 330 mt of the IOY (1.65%) may be set aside for research set aside (RSA) quota. The Council selected 330 mt because observer data analyzed in the 2010 specifications package (table 53) suggests that about 1 pound of butterfish is discarded for every 22 pounds of *Loligo* caught (2004-2008 observer data for trips with retained catch ≥ 50% *Loligo*). Thus the 15 mt of butterfish RSA (3% of 500mt) should cover about 330mt of *Loligo* landings (15*22=330) in terms of making sure that butterfish discards related to RSA *Loligo* fishing are accounted for.

The only proposed change for management measures within the 2011 specifications is to limit the roll-over of *Loligo* trimester quota from Trimester 1 to Trimester 2 such that the Trimester 2 quota can only be increased by 50% at most. Currently if Trimester 1 quota underages are more than 25% the rollover is split equally between Trimesters 2 and 3 which could lead to a relatively large transfer to Trimester 2, and the proposed change would limit the increase to 50% to reduce management uncertainty.

5.4.b Alternative 4b for *Loligo* (status quo, no action, most restrictive)

Under this alternative Max OY =32,000 mt, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0 mt. The ABC was based on the 2010 recommendation of the SSC and the latest stock assessment, SAW/ SARC 34 (2002). Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 8,170mt; Trimester 2: 3,230mt; and Trimester 3: 7,600mt. Trimester 1 underages would be split between Trimester 2 and 3 (50%-50%) if the Trimester 1 underage is greater than 25%. If the Trimester 1 underage is less than 25% of the Trimester 1 quota then the underage is applied to Trimester 3 (as is currently done), avoiding potentially small transfers that could lead to unfeasibly short season openings/closures in Trimester 2. Trimester 1 overages, if any, should be small and would still be applied to Trimester 3. Trimester 2 underages or overages would still be applied to Trimester 3. As a result of both the inherent data processing time lag and late dealer reporting in the dealer reporting program, NMFS has indicated that it would not be possible to make the underage calculation and announce a quota adjustment until up to two months after Trimester 1 ends.

5.4.c Alternative 4c for *Loligo* (least restrictive)

The specifications under this alternative would be Max OY =32,000 mt, ABC=24,000 mt, IOY,=DAH= DAP = 22,560 mt and JVP and TALFF = 0 mt. The ABC is based on the recommendation of the SSC and the latest stock assessment, SAW/ SARC 34 (2002) and the IOY is reduced to account for discards. Applying the trimester percentages described above, the trimester allocations would be: Trimester 1: 9,701mt; Trimester 2: 3,835 mt; and Trimester 3: 9,024mt. Trimester 1 underages would be split between Trimester 2 and 3 (50%-50%) if the Trimester 1 underage is greater than 25% but could only increase Trimester 2 quotas by a maximum of 50%. If the Trimester 1 underage is less than 25% of the Trimester 1 quota then the underage is applied to Trimester 3 (as is currently done), avoiding potentially small transfers that could lead to unfeasibly short season openings/closures in Trimester 2. Trimester 1 overages, if any, should be small and would still be applied to Trimester 3. Trimester 2 underages or overages would still be applied to Trimester 3. As a result of both the inherent data processing time lag and late dealer reporting in the dealer reporting program, NMFS has indicated that it would not be possible to make the underage calculation and announce a quota adjustment until up to two months after Trimester 1 ends.

Up to 330 mt of the IOY (1.65%) may be set aside for research set aside (RSA) quota. The Council selected 330 mt because observer data analyzed in the 2010 specifications package (table 53) suggests that about 1 pound of butterfish is discarded for every 22 pounds of *Loligo* caught (2004-2008 observer data for trips with retained catch ≥ 50% *Loligo*). Thus the 15 mt of butterfish RSA (3% of 500mt) should cover about 330mt of *Loligo* landings (15*22=330) in

terms of making sure that butterfish discards related to RSA *Loligo* fishing are accounted for.

The only proposed change for management measures within the 2011 specifications is to limit the roll-over of *Loligo* trimester quota from Trimester 1 to Trimester 2 such that the Trimester 2 quota can only be increased by 50% at most. Currently if Trimester 1 quota underages are more than 25% the rollover is split equally between Trimesters 2 and 3 which could lead to a relatively large transfer to Trimester 2, and the proposed change would limit the increase to 50% to reduce management uncertainty.

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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 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.

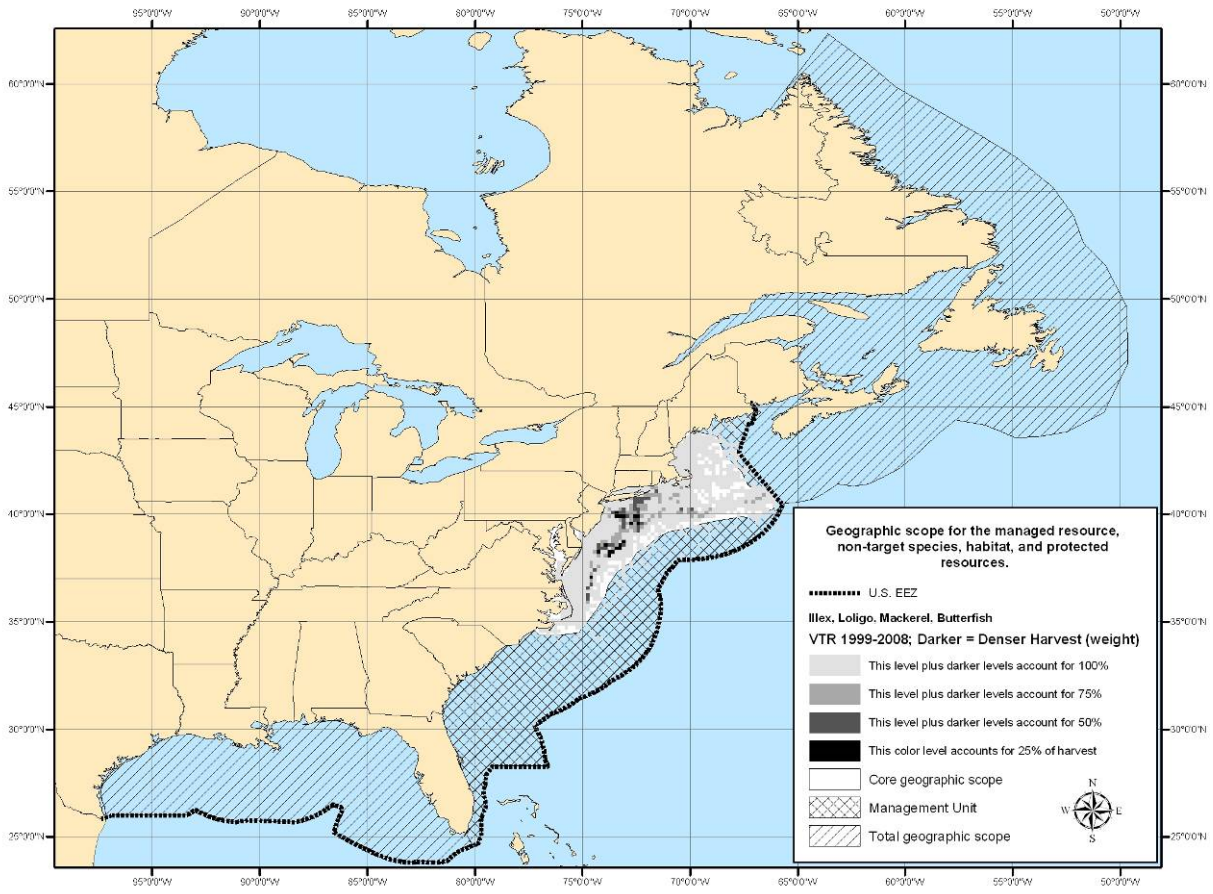

Figure 1. Geographic scope of the Atlantic mackerel, squid and butterfish fisheries.

Figures 1 and 2 use data from 1999-2008. For purposes of generally identifying the geographic scope, revising these figures with 2009 data was determined to be unnecessary. However, 2009 catch by statistical area is presented in Section 6.6.

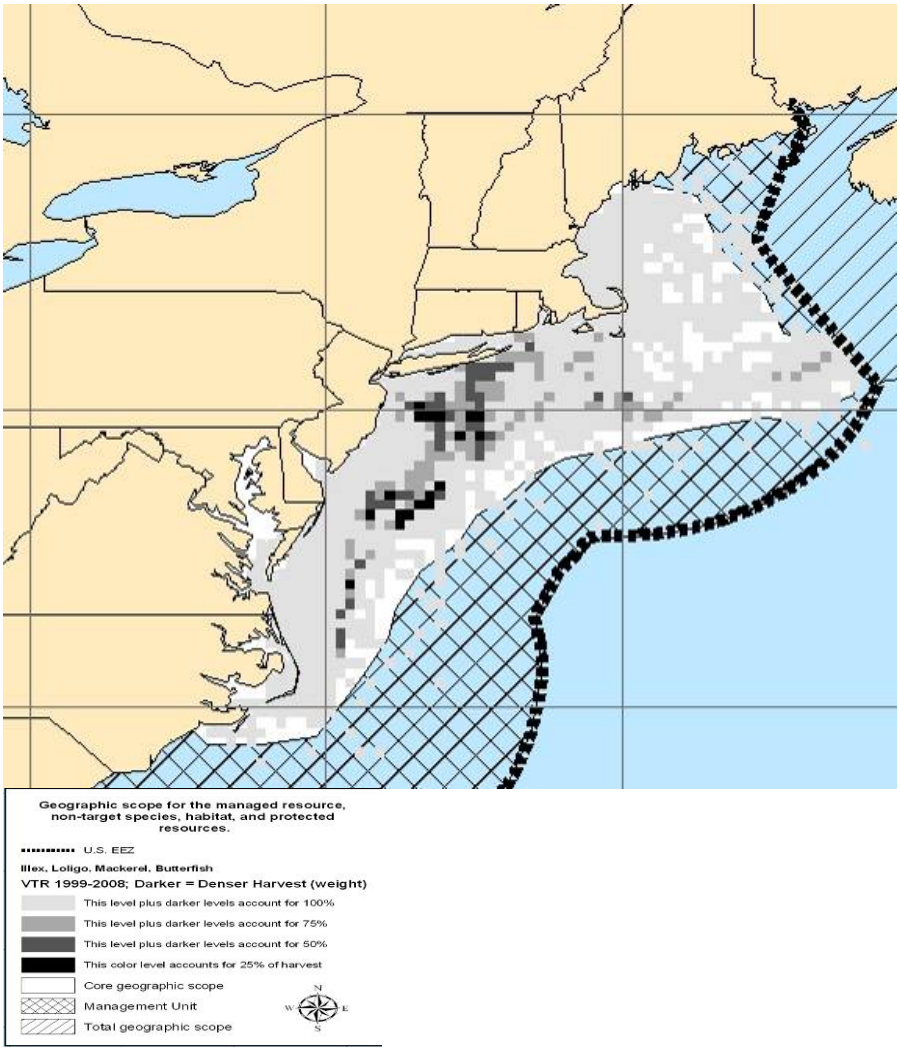

Figure 2. Detail of Core Geographic scope of the MSB fisheries.

Previous public comment has requested that the Council include mention that numerous old dump sites for municipal, industrial, and military 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 Basic 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). Atlantic mackerel in the northwest Atlantic are assessed as a unit stock 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. 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 usually attached 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 is being updated via 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. There are maps that show areas within which the text descriptions apply, and the maps for all four species are available in Amendment 8, except for *Loligo* egg EFH, which is in Amendment 9. Amendment 11 (estimated implementation in 2011) will update all of the EFH designations for MSB species.

Current EFH Textual Descriptions

Atlantic mackerel

Eggs: Offshore, EFH is the pelagic waters found over the Continental Shelf (from the coast to the limits of the EEZ), from Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where Atlantic mackerel eggs were collected in MARMAP ichthyoplankton surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel eggs are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel eggs are collected from shore to 50 ft and temperatures between 41^{o} F and 73^{o} F.

Larvae: Offshore, 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 that comprise the highest 75% of the catch where Atlantic mackerel larvae were collected in the MARMAP ichthyoplankton survey. Inshore, EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel larvae are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel larvae are collected in depths between 33 ft and 425 ft and temperatures between 43^{o} F and 72^{o} F.

Juveniles: Offshore, EFH is the pelagic water found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where juvenile Atlantic mackerel were collected in the NEFSC trawl surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where juvenile Atlantic mackerel are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, juvenile Atlantic mackerel are collected from shore to 1050 ft and temperatures between 39^{o} F and 72^{o} F.

Adults: Offshore, EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina, in areas that comprise the highest 75% of the catch where adult Atlantic mackerel were collected in the NEFSC trawl surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where adult Atlantic mackerel are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult Atlantic mackerel are collected from shore to 1250 ft and temperatures between 39^{o} F and 61^{o} F.

Illex - Pre-recruits and recruits are stock assessment terms which relate to whether or not an individual is selected by the directed bottom trawl fishery and correspond roughly to the life history stages of juveniles and adults, respectively. *Illex* pre-recruits are less than or equal to 10 cm and recruits are greater than 10 cm.

Pre-recruits: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where pre-recruit *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.

Recruits: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where recruited *Illex* were collected in the NEFSC trawl surveys. Generally, recruited *Illex* are collected from shore to 600 ft and temperatures between 39^{o} F and 66^{o} F.

Loligo - Pre-recruits and recruits are stock assessment terms which relate to whether or not an individual is selected by the directed bottom trawl fishery and correspond roughly to the life history stages juveniles and adults, respectively. *Loligo* pre-recruits are less than or equal to 8 cm and recruits are greater than 8 cm.

Eggs: EFH for *Loligo* eggs occurs in coastal and offshore bottom habitats from Georges Bank southward to Cape Hatteras. *Loligo* egg masses are found attached to rocks and boulders on sand or mud bottom, as well as attached to aquatic vegetation. Generally, the following conditions exist where *Loligo* egg EFH is found: bottom water temperatures between 10°C and 23°C, salinities of 30 to 32 ppt, and depths less than 50 meters.

Pre-recruits: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where pre-recruit *Loligo* were collected in the NEFSC trawl surveys. Generally, pre-recruit *Loligo* are collected from shore to 700 ft and temperatures between 4^{o} F and 27^{o} F.

Recruits: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where recruited *Loligo* were collected in the NEFSC trawl surveys. Generally, recruited *Loligo* are collected from shore to 1000 ft and temperatures between 39^{o} F and 81^{o} F.

Butterfish

Eggs: Offshore, EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where butterfish eggs were collected in MARMAP ichthyoplankton surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where butterfish eggs are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish eggs are collected from shore to 6000 ft and temperatures between 52^{o} F and 63^{o} F.

Larvae: Offshore, 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 areas that comprise the highest 75% of the catch where butterfish larvae were collected in the NEFSC trawl surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where butterfish larvae are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected in depths between 33 ft and 6000 ft and temperatures between 48^{o} F and 66^{o} F.

Juveniles: Offshore, EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where juvenile butterfish were collected in the NEFSC trawl surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where juvenile butterfish are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, juvenile butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37^{o} F and 82^{o} F.

Adults: Offshore, EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch where adult butterfish were collected in the NEFSC trawl surveys. Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where adult butterfish are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37^{o} F and 82^{o} F.

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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 MSB 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 MSB 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
Northern Gannet (*Morus bassanus*)	Protected

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, NEFOP 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 for Fisheries to determine whether the incidental injury or mortality qualifies (or not) for a specific category.

NMFS elevated the (mid-water) MSB fishery to Category I in the 2001 LOF but it was subsequently changed 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 MSB fisheries and several species/stocks of marine mammals compared to previous years led to the re-classification. The List of Fisheries for 2010 is available at the following internet website address: http://www.nmfs.noaa.gov/pr/interactions/lof/#lof).

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 2009 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 -- 2009" report is also available online at: http://www.nefsc.noaa.gov/nefsc/publications/tm/tm201/.

Based on data presented in the 2009 Stock Assessment Report (SAR), annual serious injury and mortality across *all* fisheries for common dolphin, white sided dolphin, and pilot whale exceeds 10% of each species PBR. PBR is 1,000, 509, and 247 for these "species", respectively, and the average annual mortality from all fisheries is 161, 352 and 167, respectively.

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:

The following information was taken from the latest stock assessment for white-sided dolphin contained in Waring *et al* (2009) which summarized incidental mortality of this species through 2007. Observer data (Obs. Data), used to measure bycatch rates, are collected within the Northeast Observer Program. NEFSC collects landings data (Weighout) that are used as a measure of total effort in the Northeast gillnet fishery. Mandatory Vessel Trip Report (VTR) (Trip Logbook) data are used to determine the spatial distribution of fishing effort in the mid-water trawl fisheries. In addition, the Trip Logbooks are the primary source of the measure of total effort (soak duration) in the mid-water and bottom trawl fisheries. A new method was used to develop preliminary estimates of mortality for the mid-Atlantic and Northeast trawl fisheries during 2003-2007. They are a product of bycatch rates predicted by covariates in a model framework and effort reported by commercial fishermen on mandatory vessel logbooks. This method differs from the previous method used to estimate mortality in these fisheries prior to 2000. Therefore, the estimates reported prior to 2000 can not be compared to estimates from 2003 and afterwards.

Short-Beaked Common dolphin

The common dolphin may be one of the most widely distributed species of cetaceans, as it is found worldwide in temperate, tropical, and subtropical seas. In the North Atlantic, common dolphins appear to be present along the coast over the continental shelf along the 200-2000 m isobaths or over prominent underwater topography from 50° N to 40°S latitude (Evans 1994). The species is less common south of Cape Hatteras, although schools have been reported as far south as eastern Florida (Gaskin 1992). They are widespread from Cape Hatteras northeast to Georges Bank (35 to 42 North latitude) in outer continental shelf waters from mid-January to May (Hain et al. 1981; CETAP 1982; Payne et al. 1984). Common dolphins move northward onto Georges Bank and the Scotian Shelf from mid-summer to autumn (Palka et al. 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, where temperature and salinity regimes are lower than on the continental slope of the Georges

Bank/mid-Atlantic region (Selzer and Payne 1988). Migration onto the Scotian Shelf and continental shelf off Newfoundland occurs during summer and autumn when water temperatures exceed 11°C (Sergeant et al. 1970; Gowans and Whitehead 1995).

The following information was taken from the most recent Stock Assessment Report for the species (Waring *et al*. 2009) 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. However, the most recent SAR considers the best abundance estimate for common dolphins to be 120,743 animals (CV=0.23). This is the sum of the estimates from two 2004 U.S. Atlantic surveys, where the estimate for the northern U.S. Atlantic is 90,547 (CV=0.24) and 30,196 (CV=0.54) for the southern U.S. Atlantic. This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat. 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). 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.* (2009) which summarizes incidental mortality of this species through 2007.

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 for 1997 and 1998 and 49 in 1999 (CV=0.97). After 1999, this fishery is included as a component of the mid-Atlantic bottom trawl fishery. For the mid-Atlantic bottom trawl fishery the mean estimated annual mortality of common dolphin was 119 (CV=0.12) during the five year period 2003-2007. The portion of estimated common dolphin mortality attributable to the directed *Loligo* fishery is unknown.

Atlantic Mackerel

The estimated fishery-related mortality attributed to this fishery was 161 (CV=0.49) animals in 1997 and 0 in 1998 and 1999. After 1999, this fishery included as a component of the mid-Atlantic bottom trawl and mid-water trawl fisheries. As noted above, the mean estimated annual mortality of common dolphin during the five year period 2003-2007 in the mid-Atlantic bottom trawl fishery was 119 animals (CV=0.12). For the mid-Atlantic mid-water trawl fishery the mean estimated annual mortality of common dolphin was 1 (CV=0.7) during the five year period 2003-2007. The portion of the estimated common dolphin mortality in the Mid-Atlantic bottom and mid-water trawl fisheries attributable to the directed Atlantic mackerel fishery is unknown.

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.

Atlantic white-sided dolphin (*Lagenorhynchus acutus*)

Atlantic 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 Jeffrey's 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. The Virginia and North Carolina observations appear to represent the southern extent of the species range. 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 total number of white-sided dolphins along the eastern USA and Canadian Atlantic coast is unknown, although the best available current abundance estimate for white-sided dolphins for the Gulf of Maine stock is 63,368 (CV=0.27) as estimated from the July to August 1999 line transect survey. This is considered the best estimate of abundance because this survey is recent and provided the most complete coverage of the known habitat. 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 the CV of the average annual mortality estimate is less than 0.3. PBR for the western North Atlantic 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* (2009) which summarized incidental mortality of this species through 2007.

Illex squid - Historically, no white-sided dolphin takes have been observed taken incidental to *Illex* squid fishing operations.

Loligo squid

According to Waring *et al*. (2009), no white-sided dolphin takes have been observed taken incidental to *Loligo* squid fishing operations since 1996.

Atlantic mackerel

NMFS NEFOP observers in the Atlantic foreign mackerel fishery reported 44 takes of Atlantic white-sided dolphins incidental to fishing activities in the continental shelf and continental slope waters between March 1977 and December 1991. 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.

Northeast Mid-water Trawl Fishery (Including Pair Trawl)

The two most commonly targeted fish in this fishery are herring (94% of vessel trip report (VTR) records) and mackerel (0.4%). The observer coverage in this fishery was highest during 2003 and 2004, 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 fit to all observed mid-water trawl data (including paired and single, and Northeast and mid-Atlantic mid-water trawls, that targeted either herring or mackerel and were observed between 2003 and 2007) provided the following annual fishery-related morality (CV in parentheses) estimates: 24 (0.56) in 2003, 19 (0.58) in 2004, 15 (0.68) in 2005, and 19 (0.44) in 2006 and 0 in 2007. The average annual estimated fishery-related mortality during 2003-2007 was 15 (0.26).

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

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). A bycatch rate model provided the following annual fishery-related mortality (CV in parentheses) estimates: 51 (0.46) in 2003, 105 (0.38) in 2004, 97 (0..36) in 2005, 54 (0.57) in 2006 and 3.2 (.70) in 2007. The average annual estimated fishery-related mortality during 2003-2007 was 62 (0.21).

Mid-Atlantic Bottom Trawl Fishery

One white-sided dolphin incidental mortality was observed in 1997 resulting in a mortality estimate of 161 (CV =1.58) animals. No takes were observed from 1998-2004 or 2006. One mortality was observed in 2005 and 2 were observed in 2007. A bycatch rate model provided the following annual fishery-related mortality (CV in parentheses) estimates: 31 (0.25) in 2003, 26 (0.2) in 2004, 38 (0.29) in 2005, 26 (0.25) in 2006 and 21 (0.24) in 2007. The average annual estimated fishery-related mortality during 2003-2007 was 28 (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). However, 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 abundance estimate for *Globicephala sp*. is 31,139 (CV=0.27) based on 2004 survey data. The minimum population size for *Globicephala sp*. is 24,866. 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.* (2009) which summarizes incidental mortality of these species through 2007. Mortality estimates within the Atlantic mackerel, squid and butterfish complex were made by sub-fishery prior to 2000. After that, each sub-fishery was re-categorized into bottom otter trawl or mid-water fishery categories.

Illex Squid

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), and 0 in 1999. After 1999, this fishery has been included in the Mid-Atlantic bottom trawl fishery.

Loligo Squid

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 and 49 in 1999 (CV=0.97). Since 1999, this fishery has been categorized in the Mid-Atlantic bottom trawl fishery.

Atlantic Mackerel

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). 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 Gulf of Maine in 2004, four in 2005 and one in 2006. A bycatch rate model provided the following annual fishery-related mortality (CV in parentheses) estimates: 31 (0.31) in 2003, 35 (0.33) in 2004, 31 (0.31) in 2005, 37 (0.34) in 2006 and 36 (0.38) in 2007. The average annual estimated fishery-related mortality during 2003-2007 was 34 (0.11).

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 bycaught in this fishery for the period 2002-2006 though because of data pooling, estimates were still generated. A bycatch rate model provided the following annual fishery-related mortality (CV in parentheses) estimates: 3.9 (0.46) in 2003, 8.1 (0.38) in 2004, 7.5 (0.76) in 2005, 0 (0) in 2006 and 4.9 (0.7) in 2007. The average annual estimated fishery-related mortality during 2003-2007 was 5 (0.31).

6.4.2 Atlantic Trawl Gear Take Reduction Plan

The NMFS convened an Atlantic Trawl Gear Take Reduction Team (ATGTRT) in 2006 as part of a settlement agreement with Center for Biological Diversity. The ATGTRT was convened with the goal of developing consensus recommendations to guide NMFS in creating a Take Reduction Plan (TRP). The TRP focuses on 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 several trawl gear fisheries in the Atlantic Ocean. These marine mammal species are known to interact with the Mid-Atlantic Mid-water Trawl fishery, which was classified in the MMPA List of Fisheries (LOF) as a Category I fishery (i.e., one that has frequent incidental mortalities or serious injuries of marine mammals) at the time the ATGRT was convened in 2006. These marine mammal species are also known to interact with the Mid-Atlantic Bottom Trawl, Northeast Mid-water Trawl, and the Northeast Bottom Trawl fisheries, which are classified as Category II fisheries (i.e., those that have annual mortality and serious injury greater than 1 percent and less than 50 percent of the PBR level) on the MMPA LOF.

Under the framework of section 118 of the Marine Mammal Protection Act (MMPA), the ATGTRT will aim to draft a 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 ATGTRT is in the unique situation of designing a take reduction plan for cetacean populations that are currently below their respective PBR levels; thus, rather than working to achieve PBR within six months of implementing the TRP, the Team can focus on the five-year goal of reaching ZMRG. Another unique characteristic of the Team is that it is gear-based rather than species-based. Although white-sided dolphins were not originally included in the settlement agreement, when looking at the data, 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. NMFS decided to include white-sided dolphins in the list of stocks under the ATGTRT's purview to proactively address bycatch of this stock before it potentially exceeds PBR.

The first meeting of the ATGTRT was held on September 19-22, 2006 in Providence, RI. The team received summary information on available data relating to abundance and mortality of the four species included in the TRP. ATGTRT members asked NMFS to reevaluate the classification of the mid-water trawl fishery as a Category I fishery based on the most recent estimates of bycatch. At that meeting, NMFS noted that the tier analysis that supported the mid-water trawl fishery's elevation to Category I was based on the average takes over the most recent five year period. During this period one of the years utilized for the mid-water trawl fishery elevation included an increase in marine mammal bycatch that appeared to drive the fisheries Category I classification. Because the increase in marine mammal takes that resulted in the elevation of the mid-Atlantic mid-water trawl fishery to Category I is no longer part of the 5-year average considered in the tier-analysis, the TRT requested that NMFS re-evaluate the classification of the mid-Atlantic mid-water trawl fishery as a Category I fishery. The tier analysis requested by the ATGTRT resulted in a reclassification of the mid-water trawl fishery to Category II in the MMPA List of Fisheries (LOF) for 2007.

A second meeting of the ATGTRT was convened in Baltimore, MD on April 25-26, 2007. NMFS scientists presented new PBR data for white-sided dolphin and explained how updated abundance estimates for those species were used to determine the new PBR. Abundance estimates, and therefore also PBR, were not updated for common dolphin, and pilot whales because the data for those species was collected in 2004 and were still considered current. Updated results on bycatch estimates by species were also presented.

In addition to presenting biological and economic information updates, NMFS briefed the ATGTRT on the timeline and requirements for developing a TRP for non-strategic stocks in Category II fisheries. A NOAA General Counsel (GC) guidance memo indicated that 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. While the GC guidance memo indicated that there is no timeline contained within the MMPA requiring the TRT to submit a draft TRP, NMFS requested that the TRT move forward and make the best effort possible to meet the 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 obtaining the ultimate goal of reducing the serious injury and mortality of marine mammals in Atlantic trawl fisheries. By the conclusion of the meeting the ATGTRT finalized a consensus research strategy to present to NMFS. The strategy stated the following:

The Atlantic Trawl Take Reduction Team (ATGTRT) recommends, by consensus, the following strategies for Atlantic Trawl Fisheries. The ATGTRT does not intend for these recommendations to be considered as a TRP for the purposes of the MMPA at this time.

Education & Outreach:

- *Operate this as an Education & Outreach Subgroup so we can include all stakeholders to inform captains/crewmen/company owners on this process.*
- *2-sided laminated placard for captains and crews to reference while at sea, that provides the following information:*
    - *Make fishermen aware of hotspots (statistical area, time, etc. . .) where observers have seen elevated interaction with marine mammals – so they can be informed of voluntary measures (i.e. reduce the number of turns and tow times while fishing at night). The Subgroup should determine whether this is applicable for bottom trawl operations.*
    - *Encourage recording and reporting of sighting of marine mammals and behavior in and around fishing operations. Hopefully these data can eventually move beyond the level of anecdotal information to become part of assessment processes.*

NMFS Assistance:

- *Develop species identification placard.*
- *Clarify takes between pair- and single- mid-water trawls and various bottom trawl fisheries.*
- *Resolve white-sided dolphin assessment uncertainty – why is there so much variation in the white-sided dolphin abundance estimates and determine stock structure?*
- *Elucidate fishery characteristics (i.e. revenue valuation, trawl and trip volumes, etc. . .) of trawl fisheries. Document the social and economic value of the trawl fisheries before mitigation.*
- *Observer program to clarify kite v. transducer panel in the pair-trawl fishery. Additional investigation is needed on whether there are kites in the pair trawl fishery (observer confusion? Given different names by captains?). Why do the pair trawls labeled this way have higher bycatch rates?*
- *Update Pilot Whale abundance estimates with 2006 survey data. Determine if this is applicable to other stocks.*
- *Generate maps from Maine to the North Carolina/South Carolina border that encompass all of the closures and gear modification areas affecting these trawl fisheries (MMPA, National Marine & Horseshoe Crab Sanctuaries, MSA, etc).*
- *Convene Industry/NMFS workshop to help differentiate the various bottom trawl fisheries in New England and the Mid-Atlantic, based on fishing practices.*
- *Add info on kites to bottom trawl observer logs.*
- *Provide more observer coverage in the Mid-Atlantic.*
- *For mid-water trawl, between 38 – 39 lat, more observer coverage is needed to see if the elevated bycatch rate there really exists or is just due to very low coverage.*

- *More observer coverage is needed in 622 and 627 for bottom trawls, to see what is going on there.*

Research & Gear Mitigation

- *Operate this as a Research & Gear Mitigation Subgroup so we can include all stakeholders.*
- *Convene Industry Workshop to build on the 2006 workshop in Atlantic City, NJ which reviewed the characteristics of trawl fisheries with takes, and early field research.*
- *Phased Research Plan:*
    - *Step 1*
        - *Industry video of normal trawl operations.*
        - *Industry video and sonar of mammals interacting with gear (in consultation with NEFSC, SEFSC – Pascagoula Lab, industry consultants, etc).*
    - *Step 2*
        - *Field experimentation with various excluder devices and other gear modifications (w/ NEFSC, SEFSC – Pascagoula Lab, industry consultants, etc. . .).*
        - *Observations of fishing practice modifications.*
    - *Step 3*
        - *Industry and partners bring results of research to Research & Gear Mitigation Subgroup to discuss the information and how to move forward.*

Caveats and needs that apply to the Research & Gear Mitigation component of the Strategy:

- *Funding for video equipment, vessel use, lost revenues*
- *Marine mammal takes occurring in NMFS-sanctioned experiments not be extrapolated into the fishery. [NMFS will investigate various options against takes counting for PBR.]*
- *NMFS reviews videos and provides confidentiality protection for video materials.*
- *Expeditiously process necessary permits.*
- *No loss of days at sea for vessel participation.*

Other Research Recommendations

- *Additional information is needed on the annual distribution of these marine mammals. General research on seasonal overlap of the mammals and the fisheries will be helpful.*
- *NMFS work expeditiously to differentiate pilot whales and takes by species.*
- *Why is there a correlation between vessel horsepower and vessel bycatch? NMFS can analyze the data they have to see why vessel horsepower is important (size of boat, speed, size of net, noise, etc). It would also be good to brainstorm with industry to get their thoughts on this.*

Review observer data to look for correlations in regards to marine mammal takes, diet and discards.

Additional background information on the ATGTRP, including complete meeting summaries, is available at the following website: http://www.nero.noaa.gov/prot_res/atgtrp/index.html.

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

Leatherback sea turtles (*Dermochelys coriacea*)

Leatherback turtles (*Dermochelys coriacea*) were listed as endangered under the ESA on June 2, 1970. Leatherback turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). The leatherback sea turtle is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS, 1995). Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS, 1992). Located in the northeastern waters during the warmer months, this species is found in coastal waters of the continental shelf and near the Gulf Stream edge, but rarely in the inshore areas. However, leatherbacks may migrate close to shore, as a leatherback was satellite tracked along the mid-Atlantic coast, thought to be foraging in these waters. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) also observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina).

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus, Chryaora*, and *Aurelia* (Rebel 1974)), cnidarians (*medusae, siphonophores*) and tunicates (*salps, pyrosomas*). Time-Depth-Recorder data recorded by Eckert et al. (1998b) indicate that leatherbacks are night feeders and are deep divers, with recorded dives to depths in excess of 1000 meters. However, leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas associated with a dense aggregation of *Stomolophus*. Leatherbacks also occur annually in places such as Cape Cod and Narragansett Bays during certain times of the year, particularly the fall.

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

Poaching is not known to be a problem for U.S. nesting populations. However, numerous fisheries that occur in both U.S. state and Federal waters are known to negatively impact juvenile and adult leatherback sea turtles. These include incidental take in several commercial and recreational fisheries. Fisheries known or suspected to incidentally capture leatherbacks include

those deploying bottom trawls, off-bottom trawls, purse seines, bottom longlines, hook and line, gill nets, drift nets, traps, haul seines, pound nets, beach seines, and surface longlines (NMFS and USFWS 1992). Leatherback interactions with the southeast shrimp fishery are also common. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, the NMFS has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NMFS established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows the NMFS to quickly close the area or portions of the area to the shrimp fleet on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates. Other emergency measures may also be used to minimize the interactions between leatherbacks and the shrimp fishery. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, the NMFS required shrimp vessels operating in a specified area to use TEDs with a larger opening for a 30-day period beginning December 8, 1999 (64 FR 69416) so that leatherback sea turtles could escape if caught in the gear.

Leatherbacks are also susceptible to entanglement in lobster and crab gear, possibly as a result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, attraction to the buoys which could appear as prey, or the gear configuration which may be more likely to wrap around flippers.

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 most recent 5-year ESA leatherback turtle status review was completed in 2007 (NMFS & USFWS 2007c) which included an analysis of the most recent population and demographic data available for the species. The most recent population size estimate for the North Atlantic Ocean is a range of 34,000- 94,000 adult leatherbacks where the species appears to be stable or increasing (NMFS & USFWS 2007c). However, the East Pacific and Malaysian leatherback populations appear to have collapsed. Given the best available information, NMFS & USFWS (2007) concluded that the leatherback turtle should not be reclassified under the ESA and should remain listed as endangered. In addition, the review also concluded that available information indicates that an analysis and review of the species should be conducted in the future to determine if application of the Distinct Population Segment policy under the ESA to the endangered leatherback turtle is warranted.

Fishery Interactions

One leatherback turtle 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. Another leatherback turtle was caught in June of 2009 southwest of Nantucket in a bottom otter trawl targeting *Loligo*. This turtle swam away "very quickly." There are no mortality estimates for leatherback turtles that are attributed to the *Loligo* fishery. An estimate of total bycatch of this species is not available as the rate of interaction is low.

Green sea turtle (*Chelonia mydas*)

Green sea turtles are generally found in waters between the northern and southern 20°C isotherms. In the western Atlantic region, the summer developmental habitat generally encompasses estuarine and coastal waters as far north as Long Island Sound and south throughout the tropics (NMFS 1998). Most of the individuals reported in U.S. waters are immature (NMFS 1998). Green sea turtles found north of Florida during the summer must return to southern waters in autumn or risk the adverse effects of cold temperatures.

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

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

The most recent 5-year ESA green sea turtle status review was completed in 2007 (NMFS & USFWS 2007a) which included an analysis of the most recent population and demographic data available for green sea turtles. Overall, of the 23 threatened population nesting sites for which data are available, 10 nesting populations are increasing, 9 are stable, and 4 are decreasing (NMFS & USFWS 2007a). Long term continuous data sets (i.e. $\geq$ 20 years) are available for nine sites, all of which are increasing. Despite the apparent global increase in numbers, NMFS & USFWS (2007a) noted that this positive overall trend should be viewed with caution because trend data are available for just over half of all sites examined. Within the Western Atlantic/Caribbean, there are five threatened breeding populations, all of which appear to be stable or increasing (NMFS & USFWS 2007a). The green turtle nesting population of Florida,

which is listed as endangered, also appears to be increasing based on 18 years (1989-2006) of index nesting data collected throughout the state (NMFS & USFWS 2007a). While green turtle nest counts have generally increased, NMFS & USFWS (2007a) concluded that populations of both endangered and threatened green turtles should not be reclassified under the ESA. However, the review also concluded that available information indicates that an analysis and review of the species should be conducted in the future to determine if application of the Distinct Population Segment policy under the ESA to both endangered and threatened green turtle populations is warranted.

Fishery Interactions

Loligo Fishery

One green sea turtle was observed captured in a bottom otter trawl targeting *Loligo* in August 2009 south of Martha's Vineyard. The turtle was released alive after 1 hour of resuscitation on deck. There are no mortality estimates for green sea turtles that are attributed to the *Loligo* fishery. 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 habitats include the open ocean, continental shelves, bays, lagoons, and estuaries (NMFS& FWS 2007b).

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).

The most recent 5-year ESA loggerhead sea turtle status review was completed in 2007 (NMFS & USFWS 2007b) which included a review of the most recent research results for loggerhead sea turtles. Genetic analyses conducted since the last five-year review indicate there are five demographically independent groups in the Western North Atlantic, corresponding to nesting beaches found in Florida and Mexico. The primary metric used to evaluate trends in global loggerhead populations are counts of beach nests, many of which occur in areas outside U.S. waters. Given that loggerhead nest counts have generally declined during the period 1989-2005, NMFS & USFWS (2007b) concluded that loggerhead turtles should not be delisted or reclassified and should remain designated as threatened under the ESA. However, the review

also concluded that available information indicates that an analysis and review of the species should be conducted in the future to determine if application of the Distinct Population Segment policy under the ESA is warranted for the species. Additionally, the Center for Biological Diversity and the Turtle Island Restoration Network filed a petition to reclassify loggerhead turtles in the North Pacific Ocean as a distinct population segment (DPS) with endangered status and designate critical habitat under the ESA (72 *Federal Register* 64585; November 16, 2007). NMFS concluded that the petition presented substantial scientific information such that the petition action may be warranted, and published a notice and request for comments, available at: http://www.nmfs.noaa.gov/pr/pdfs/fr/fr72-64585.pdf.

In 2008, NMFS and the USFWS convened a Biological Review Team (BRT) to evaluate the status of loggerhead sea turtles. The BRT submitted their review in August 2009 which included recommendations to designate nine DPSs for the species worldwide. Most recently, NMFS and the USFWS concurred with the BRT findings that the Northwest Atlantic loggerhead population should be listed as a distinct population segment and have proposed that the listing status of the NW Atlantic DPS be changed from threatened to endangered (see 75 *Federal Register* 12598 ; March 16, 2010). NMFS and USFWS are currently seeking public comment on the proposed change in listing status for this DPS.

The Second Revision of the Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea turtle (*Caretta caretta*) was published in December 2008 (NMFS and USFWS 2008). The Loggerhead Recovery Team conducted a detailed analysis of threats to assist in prioritizing recovery actions. The highest priority threats, adjusted for relative reproductive values for each life stage/ecosystem, include bottom trawl, pelagic longline, demersal longline, and demersal large mesh gillnet fisheries; legal and illegal harvest; vessel strikes; beach armoring; beach erosion; marine debris ingestion; oil pollution; light pollution; and predation by native and exotic species.

Fishery Interactions

Illex Fishery

A single capture of a loggerhead turtle on an *Illex* trip was documented in 1995 according to the NEFOP 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 have been no loggerhead turtles observed to be captured in the *Illex* fishery since the 1995 observation (based on unpublished NEFOP 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. One loggerhead turtle was

observed to be captured in the *Loligo* fishery in July 2008. Four were captured in 2009 (one on a trip in September and three on a trip in October - all were released alive). An estimate of total bycatch of this species in the *Loligo* fishery is not currently available. 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*).

NMFS Sea Turtle Conservation Strategy

NMFS announced in May 2009 (Federal Register / Vol. 74, No. 88 / Friday, May 8, 2009) its intention to prepare an Environmental Impact Statement (EIS) and to conduct public scoping meetings to comply with the National Environmental Policy Act (NEPA) by assessing potential impacts resulting from the proposed implementation of new sea turtle regulations in the Atlantic and Gulf of Mexico trawl fisheries. These requirements are proposed to protect threatened and endangered sea turtles in the western Atlantic Ocean and Gulf of Mexico from incidental capture, and would be implemented under the Endangered Species Act (ESA). NMFS announced consideration of rulemaking for these new sea turtle regulations February 15, 2007 in an Advance Notice of Public Rulemaking.

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the Endangered Species Act of 1973 (ESA). The Kemp's ridley (Lepidochelys kempii), leatherback (Dermochelys coriacea), and hawksbill (Eretmochelys imbricata) are listed as endangered. Loggerhead (Caretta caretta) and green (Chelonia mydas) turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered. Due to the inability to distinguish these green turtle populations away from the nesting beach, green turtles are considered endangered wherever they occur in United States waters. Incidental capture (bycatch) of sea turtles in fisheries is a primary factor hampering the recovery of sea turtles in the Atlantic Ocean and the Gulf of Mexico.

To address this factor comprehensively, NMFS initiated a Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries (Strategy). The Strategy is a gear-based approach to addressing sea turtle bycatch. Certain types of fishing gear are more prone to incidentally capture sea turtles than others, depending on the design of the gear, the way the gear is fished, and/or the time and area within which it is fished. The Strategy provides a framework to evaluate sea turtle interactions by gear type in order to have a more comprehensive assessment of fishery impacts across fishing sectors as well as across state, federal, and regional boundaries. Through this Strategy, NMFS seeks to address sea turtle bycatch across jurisdictional boundaries and fisheries for gear types that have the greatest impact on sea turtle populations.

Based on documented sea turtle-fishery interactions, NMFS has identified several gear types that need to be addressed to reduce incidental capture of sea turtles. These gear types include, but are not limited to: gillnets, longlines, trap/pot and trawl gear. Trawl gear has been identified as a priority for addressing sea turtle bycatch, given our knowledge of the level of bycatch in this gear and the availability of technology that is effective at excluding sea turtles from capture in trawl gear.

NMFS is now working to develop and implement bycatch reduction regulations for trawl fisheries in the Atlantic and Gulf of Mexico when and where sea turtle bycatch has occurred or where gear, time, location, fishing method, and other similarities exist between a particular trawl fishery and a trawl fishery where sea turtle bycatch has occurred. Turtle Excluder Devices (TEDs) have been proven to be an effective method to minimize adverse effects related to sea turtle bycatch in the shrimp trawl fishery, summer flounder trawl fishery, several state trawl fisheries, and certain other trawl fisheries around the world. TEDs have an escape opening, usually covered by a webbing flap that allows sea turtles to escape from trawl nets. While TEDs have potential as a bycatch reduction device for all trawl fisheries, differences in trawl designs and fishing methods may necessitate modifications or adjustments to the design of existing TEDs before they can be applied in other trawl fisheries. Testing is necessary to ensure that feasible TED designs for specific fisheries still accomplish the desired sea turtle bycatch reduction goals and to determine the TEDs' impact on target catch retention. It is possible that TEDs may not be feasible for some trawl fisheries. In the event that TEDs are not a viable option, other regulations, e.g., tow time restrictions and time/area closures, may need to be considered. NMFS anticipates a phased approach to the implementation of regulations to reduce sea turtle bycatch in trawl fisheries as the information needed to support and properly analyze regulations in various trawl type becomes available. The ANPR specified those trawl fisheries for which the first phase of establishment of conservation measures via regulation are being considered.

Under the Strategy, there is a proposed three-phase approach to regulating trawl fisheries. The first phase, ''Trawl Phase I,'' will include the following fisheries summer flounder, Atlantic sea scallop, whelk, calico scallop and the flynet fisheries for croaker and weakfish. The second phase, ''Trawl Phase II,'' will likely include sheepshead/black drum/king whiting, porgy, skimmer, Spanish sardine/scad/ladyfish/ butterfish, trynet, squid/mackerel/butterfish, and multispecies (large and small mesh) trawl fisheries. Phase three, ''Trawl Phase III,'' will likely include the skate, horseshoe crab, monkfish, bluefish, spiny dogfish, and the herring trawl fisheries. Given that NMFS is still in the process of developing and testing the appropriate TED technology for phases two and three fisheries, it is possible that some fisheries in Phase II may move to Phase III or vice versa. Additional trawl fisheries that may exist or develop but have not been identified above would also be considered in Phase II and/or Phase III as information becomes available on those fisheries. For some of these fisheries, TEDs may not be effective given the configuration of the gear or the size of the target species. For those fisheries in which TEDs are not effective, other mitigation measures, such as time and area closures or tow time restrictions, may be considered. The EIS will provide background on the overall Strategy but, due to the state of the current knowledge on Phase II and Phase III, the EIS analyses will focus on fisheries that were identified for Trawl – Phase I.

NMFS will evaluate a range of alternatives in the Draft EIS for implementing phase one of the Strategy to reduce sea turtle bycatch and mortality in trawl fisheries along the Atlantic Coast. In addition to evaluating the status quo, NMFS will evaluate several alternatives. These alternatives include time and area closures, requiring the use of TEDs in the summer flounder, whelk, croaker and weakfish flynet and calico scallop trawls for the entire Atlantic Coast, as well as combination of spatial and temporal options. In terms of spatial options, sea turtles in U.S. waters range as far North as Georges Bank and the Gulf of Maine, but may be less likely to

interact with a fishery towards the northern extent of this range. We will likely evaluate several alternatives related to the northern/northeastern extent of any required gear modification or other regulation. In general, NMFS is considering applying any gear modification or other regulation shoreward to the mean high water line. Similarly, several alternatives will likely be evaluated for the temporal extent of when a regulation would be in effect, as sea turtles migrate north along the Atlantic coast as waters warm each year, and are only present in more northern areas during the warmer months. Several datasets are available to help select and analyze the various spatial and temporal alternatives; these include fisheries landings and catch reports, observer data, sea surface temperature data, sea turtle strandings data, and sea turtle sighting and survey data.

6.4.4 Birds

Northern Gannet (*Morus bassanus*)

The Northern gannet is a migratory seabird federally protected in the U.S. and Canada. Gannets spend the boreal summer along coastal Canada and the winter along the U.S. East Coast continental shelf waters. North American breeding colonies exist at 6 main sites in the Gulf of St. Lawrence and along the Atlantic coast of Newfoundland. During the nesting season, March – November, birds forage throughout the North Atlantic from the Bay of Fundy, off the coasts of Newfoundland, Labrador and Greenland and throughout the Gulf of St. Lawrence. Dispersal from breeding sites begins in September, where gannets migrate south along the Northeast Atlantic coast and are considered common winter residents off most Northeast coastal states. Primary prey of the Northern gannet include herring, mackerel and squids. North American breeding population has been increasing since the early 1970's and in 2000 the population was estimated at 144,596 individuals. Northern gannets were not listed as a species of conservation concern by the USFWS in 2008.

Northern gannet Fishery Interactions (based on targeted species as reported by captain on observed trips):

Illex squid: No interactions observed for 2004 – 2008.

Loligo squid: For 2005 to 2009, one Northern Gannet take was observed in 2009.

Atlantic mackerel: For 2005 to 2009 a total of 63 Northern Gannets have been observed (2005, n = 1; 2006, n = 2; 2007, n = 30; 2008, n = 12; 2009 n = 18).

Butterfish: No interactions observed for 2004 – 2008.

6.5 Fishery, 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 10's FSEIS, available at http://www.nero.noaa.gov/nero/regs/com.html (data through 2006). An update for 2009 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: stock status; history of landings, specification performance (since mandatory reporting in 1997); 2009 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; areas fished; market overview if applicable; and recreational landings if applicable. Some port level information has been omitted because of confidentiality issues.

6.6 Fishery, and Socioeconomic Description (Human Communities)

6.6.1 Atlantic mackerel

6.6.1.1 Status of the Stock

The Atlantic mackerel stock was most recently assessed via a Transboundary Resource Assessment Committee in 2010 (TRAC 2010), which analyzed data though 2008 (www.mar.dfo-mpo.gc.ca/science/trac/tsr.html). A number of different models and model formulations were evaluated. Given the uncertainty in the assessment results, the TRAC agreed that short term projections and characterization of stock status relative to estimated reference points would not be an appropriate basis for management advice at this time. Given current indications of reduced productivity and lack of older fish in the survey and catch, the TRAC recommended that annual total catches not exceed the average total landings (80,000 mt) over the last three years (2006-2008) until such time that new information suggests that a different amount is appropriate. SSB outputs from the final TRAC model are included below in Figure 3 but were considered useful only for the purposes of indicating likely trends.

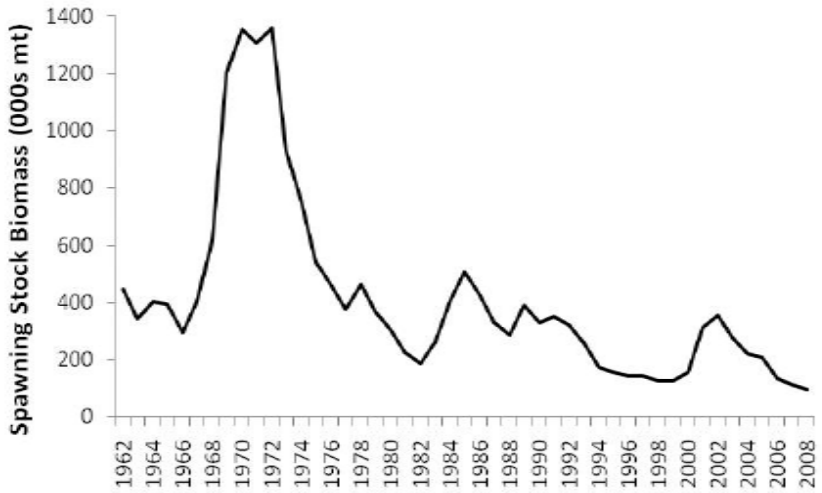

Figure 3. 2010 Mackerel TRAC SSB final model output.

NEFSC Spring Survey indices (Geometric Mean) through 2009 for Atlantic Mackerel are included below in Figure 4. Taking the Geometric mean of a given year's values for individual hauls dampens the impact of individual large hauls and was the way the survey data was used in the 2010 TRAC assessment. It is important to note that the 2009 value is adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate. Additional calibration information may be found at: http://www.nefsc.noaa.gov/publications/crd/crd1005/index.html (Miller et al 2010).

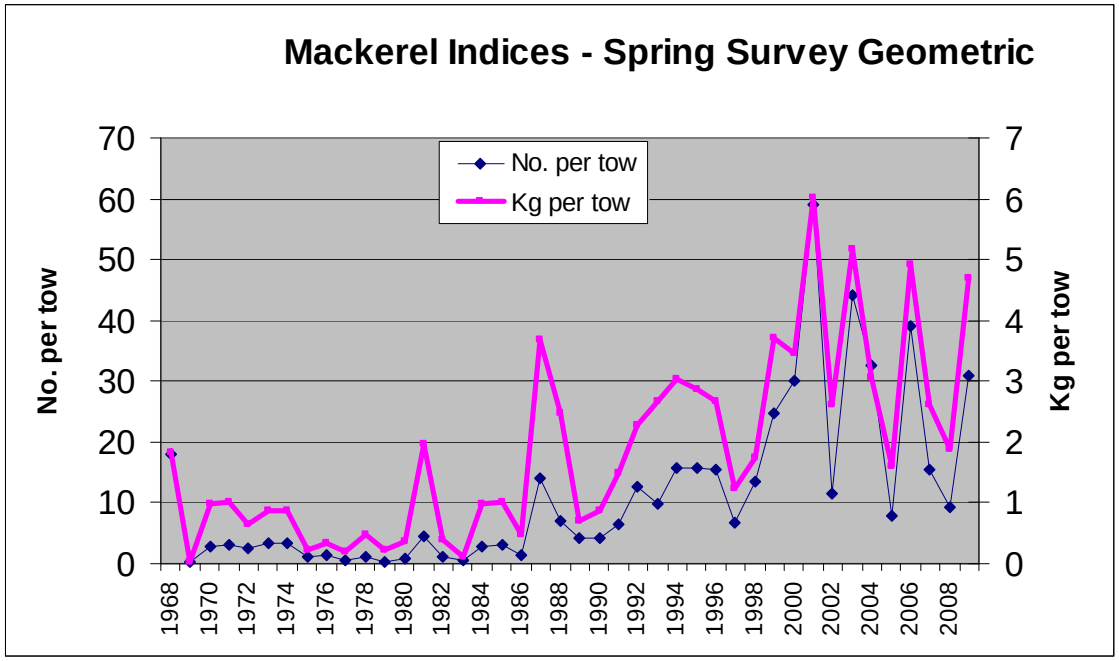

Figure 4. Spring Survey Atlantic Mackerel Indices 1968-2009.

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 MSA 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 5).

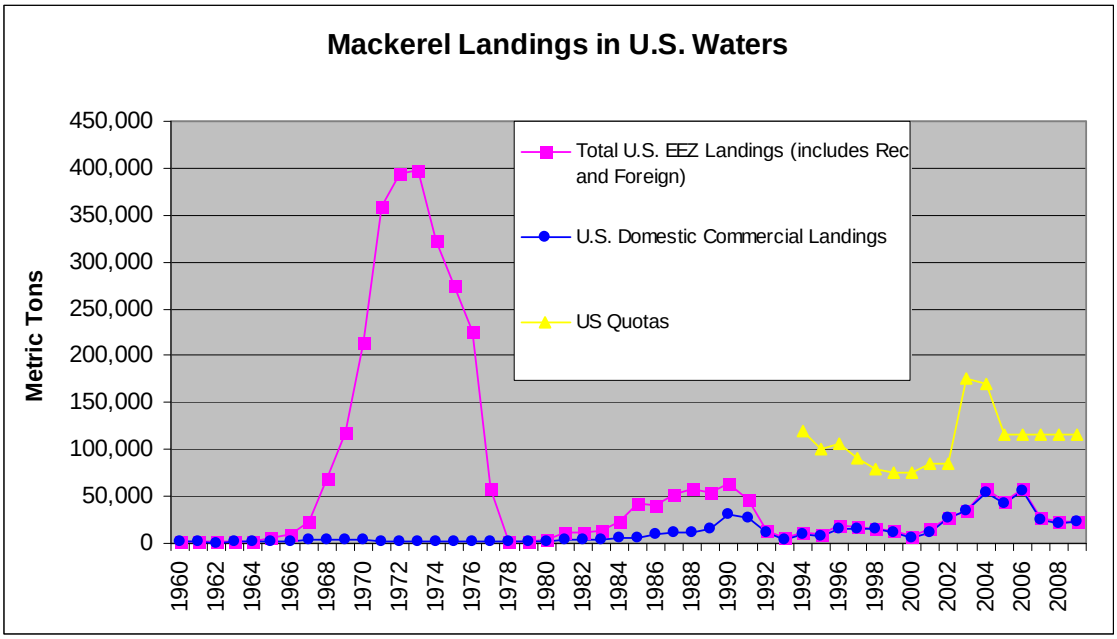

Figure 5. Atlantic mackerel landings within 200 miles of U.S. Coast.

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 years have seen a significant drop-off in harvest. Price (nominal) has fluctuated without trend since 1982 and averaged $352/mt in 2009.

Analysis of NMFS weighout data is used to chart annual estimates for U.S. Atlantic mackerel landings (mt), ex-vessel value ($), and prices 1982-2009 ($/mt) in the figures below.

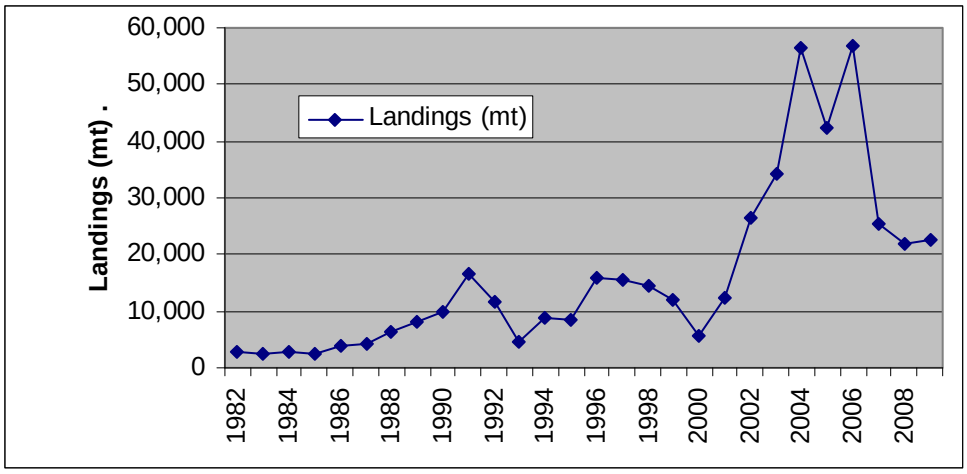

Figure 6. U.S. Atlantic mackerel landings.
Source: Unpublished NMFS dealer reports

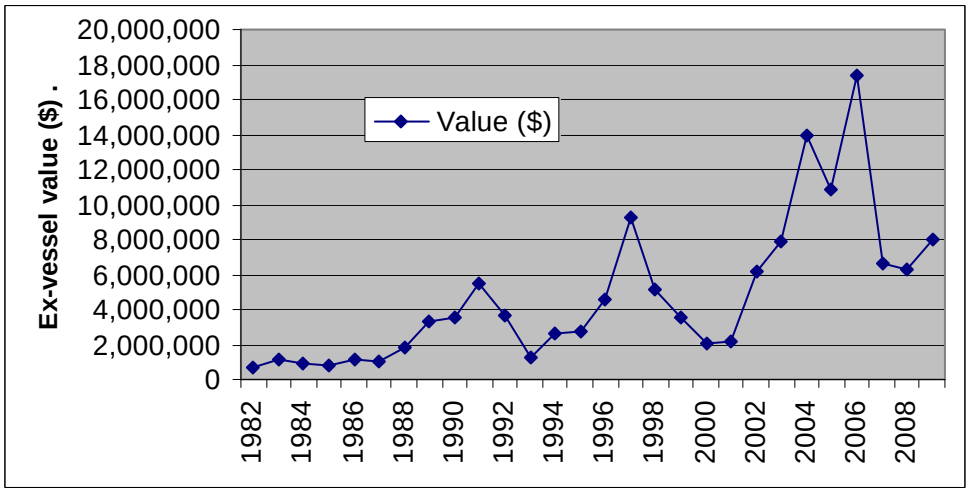

Figure 7. U.S. Atlantic mackerel ex-vessel revenues.
Source: Unpublished NMFS dealer reports

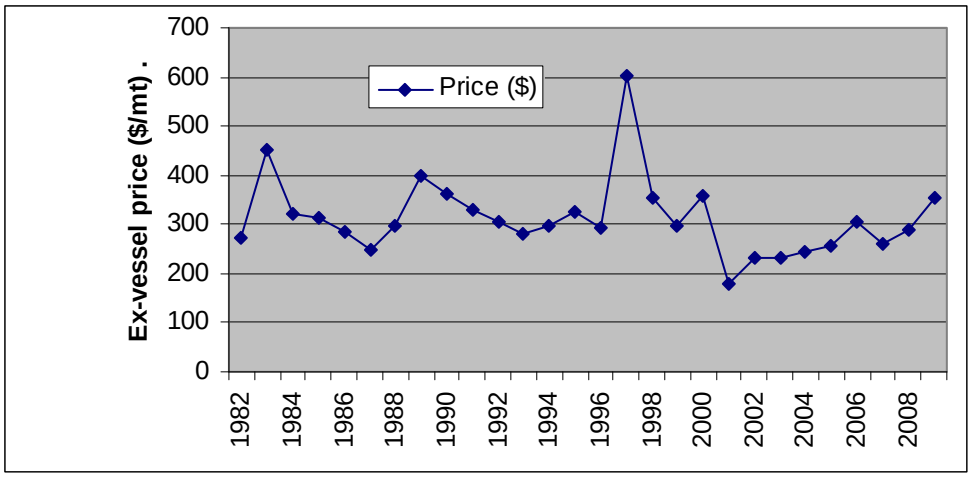

Figure 8. U.S. Atlantic mackerel ex-vessel prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage mackerel is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the DAH is landed. Mandatory reporting for mackerel was fully instituted in 1997 so specification performance since 1997 is most relevant. Table 3 lists the performance of the mackerel fishery (commercial and recreational together) compared to its DAH. There have been no quota overages.

Table 3. Mackerel DAH Performance. (mt)

Year	Harvest (Commercial and Recreational)	Quota	Percent of Quota Landed
1997	17,140	90,000	19%
1998	15,215	80,000	19%
1999	13,366	75,000	18%
2000	7,097	75,000	9%
2001	13,876	85,000	16%
2002	27,824	85,000	33%
2003	35,068	175,000	20%
2004	55,520	170,000	33%
2005	43,220	115,000	38%
2006	58,493	115,000	51%
2007	26,431	115,000	23%
2008	22,439	115,000	20%
2009	23,382	115,000	20%

Source: Unpublished NMFS dealer reports

6.6.1.3 2009 Commercial Fishery and Community Analysis

The following tables describe, for Atlantic mackerel in 2009, the total landings, value, numbers of vessels making landings, numbers of trips landing mackerel, price per metric ton (Table 4), landings by state (Table 5), landings by month (Table 6), landings by gear (Table 7), numbers of permitted and active vessels by state (Table 8), numbers of uncanceled permits over time (Figure 9), numbers of permitted and active dealers by state (Table 9), and landings by NMFS federal permit category (Table 10). Previous Specification EA's have included port information but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 4. Total landings and value of Atlantic mackerel during 2009.

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

	Landings (mt)	Value ($)	Vessels	Trips	$/mt
Atlantic mackerel	22,634	7,974,016	328	1,886	$352

Source: Unpublished NMFS dealer reports

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Table 5. Atlantic mackerel landings (mt) by state in 2009.

State	Landings (mt)	Pct_of_Total
Massachusetts	13697.91	61%
New Jersey	4651.71	21%
Rhode Island	4108.33	18%
New York	88.53	0%
Connecticut	52.78	0%
Maine	24.47	0%
Virginia	9.54	0%
North Carolina	0.85	0%
New Hampshire	0.33	0%
Maryland	0.01	0%
Total	22,634	100%

Source: Unpublished NMFS dealer reports

Table 6. Atlantic mackerel landings (mt) by month in 2009.

MONTH	Landings (mt)	Pct of Total
January	10,947	49%
February	7,767	10%
March	3,271	12%
April	429	24%
May	67	0%
June	17	0%
July	6	0%
August	18	0%
September	23	0%
October	9	0%
November	11	0%
December	69	4%
Total	22,634	100%

Source: Unpublished NMFS dealer reports

Table 7. Atlantic mackerel landings (mt) by gear category in 2009.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,MIDWATER PAIRED	9,318	41%
TRAWL,OTTER,BOTTOM,FISH	6,758	30%
TRAWL,OTTER,MIDWATER	5,670	25%
Other	890	4%
Total	22,634	100%

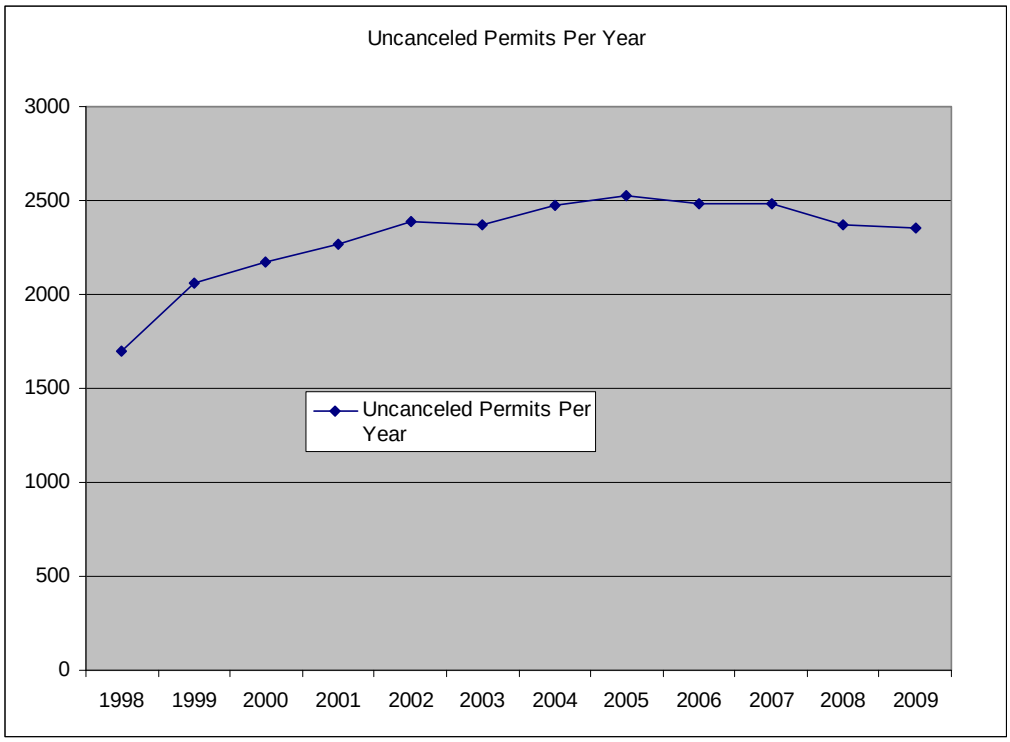
Source: Unpublished NMFS dealer reports

Table 8. Atlantic mackerel vessel permit holders and active permit holders in 2009 by homeport state (HPST).

HPST	Permitted Vessels	Active Vessels
MA	950	70
NJ	290	36
ME	280	5
NY	235	32
RI	146	38
NH	104	13
VA	103	.
NC	96	6
CT	39	6
MD	32	3
FL	17	.
DE	11	1
PA	8	.
Other	8	2
Total	2319	212

Source: unpublished NMFS permit and dealer data.
(Note: Table 8 active vessel numbers are less than Table 4 numbers because Table 8 only includes vessels w/ federal permits)

Figure 9. Uncanceled Mackerel Permits Per Year



Source: Unpublished NMFS dealer reports

Table 9. Atlantic mackerel, squid, and butterfish dealer permit holders and those that made Atlantic mackerel purchases in 2009 by state.

State	Permitted Dealers	Active Dealers
MA	178	28
NY	124	18
RI	52	12
NC	35	7
ME	42	5
VA	33	5
NH	17	4
NJ	80	4
CT	11	1
MD	18	1
Other	31	0
Total	621	85

Source: unpublished NMFS permit and dealer reports.

Table 10. Atlantic mackerel landings by permit category for the period 2000-2009.

Year	Atlantic Mackerel Permit		Party/Charter		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	Quota
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	56,099	99%	0	0%	339	1%	56,438	170,000
2005	41,604	99%	0	0%	604	1%	42,209	115,000
2006	56,706	100%	0	0%	155	0%	56,860	115,000
2007	24,898	97%	0	0%	649	3%	25,547	115,000
2008	21,322	98%	0	0%	427	2%	21,748	115,000
2009	22,494	99%	0	0%	141	1%	22,635	115,000

Source: unpublished NMFS permit and dealer reports.

6.6.1.4 Description of areas fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for mackerel in 2009 by NMFS three digit statistical area (see Figure 10) are given in Table 11.

Table 11. Statistical areas from which 1% or more of Atlantic mackerel were kept in 2009 according to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
612	6,148	27%
613	4,401	19%
615	4,036	18%
539	2,424	11%
616	1,877	8%
611	892	4%
622	745	3%
621	472	2%
121	363	2%
525	335	1%
537	282	1%

Source: Unpublished NMFS VTR reports.

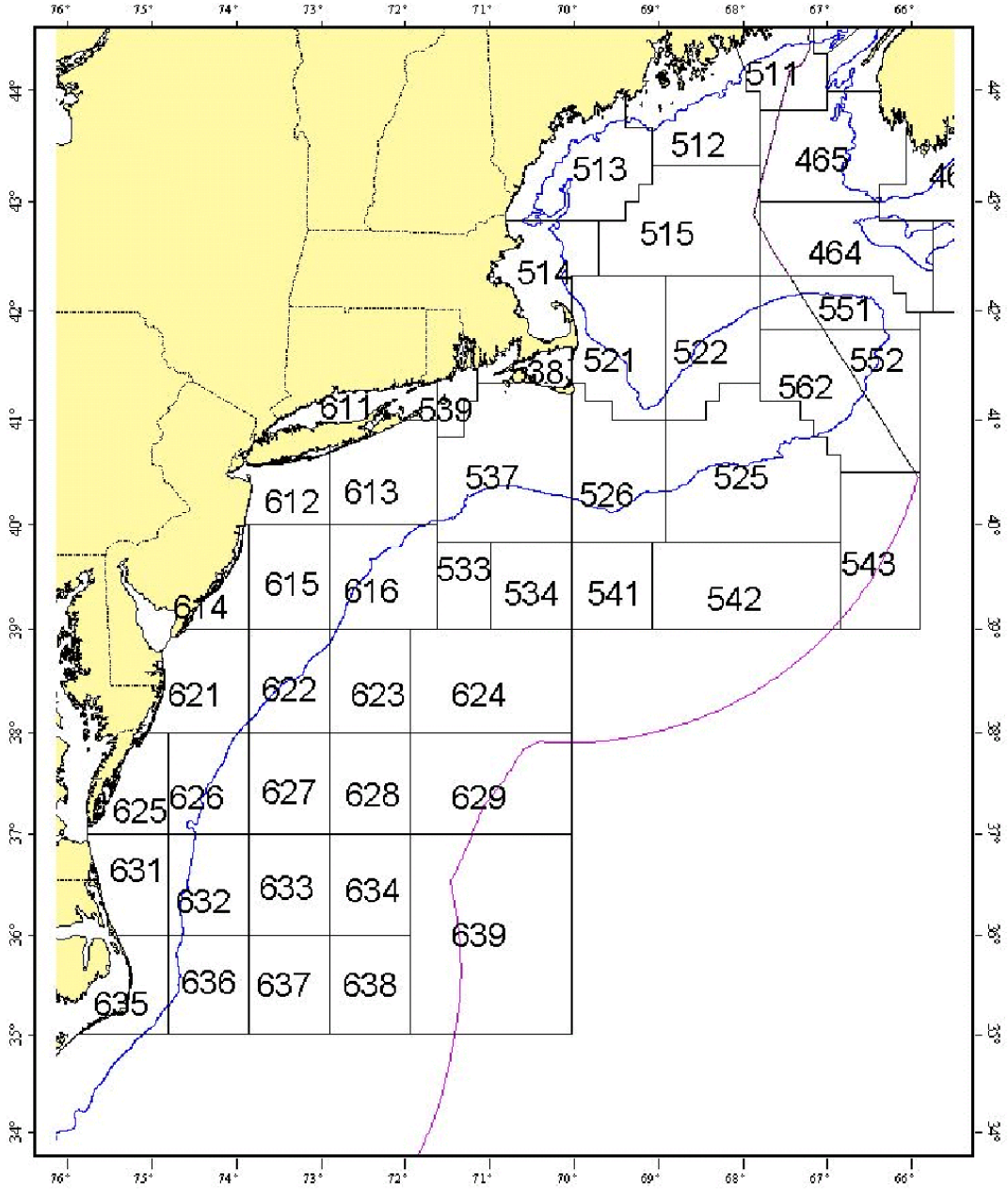


Figure 10. NMFS Statistical Areas

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 specification 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. (Figure 11) (http://www.fao.org/fishery/statistics/). Prices for exported U.S. mackerel, likely a good indication of prices on the world market, averaged $1,223 per mt in 2009 (*Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division*).

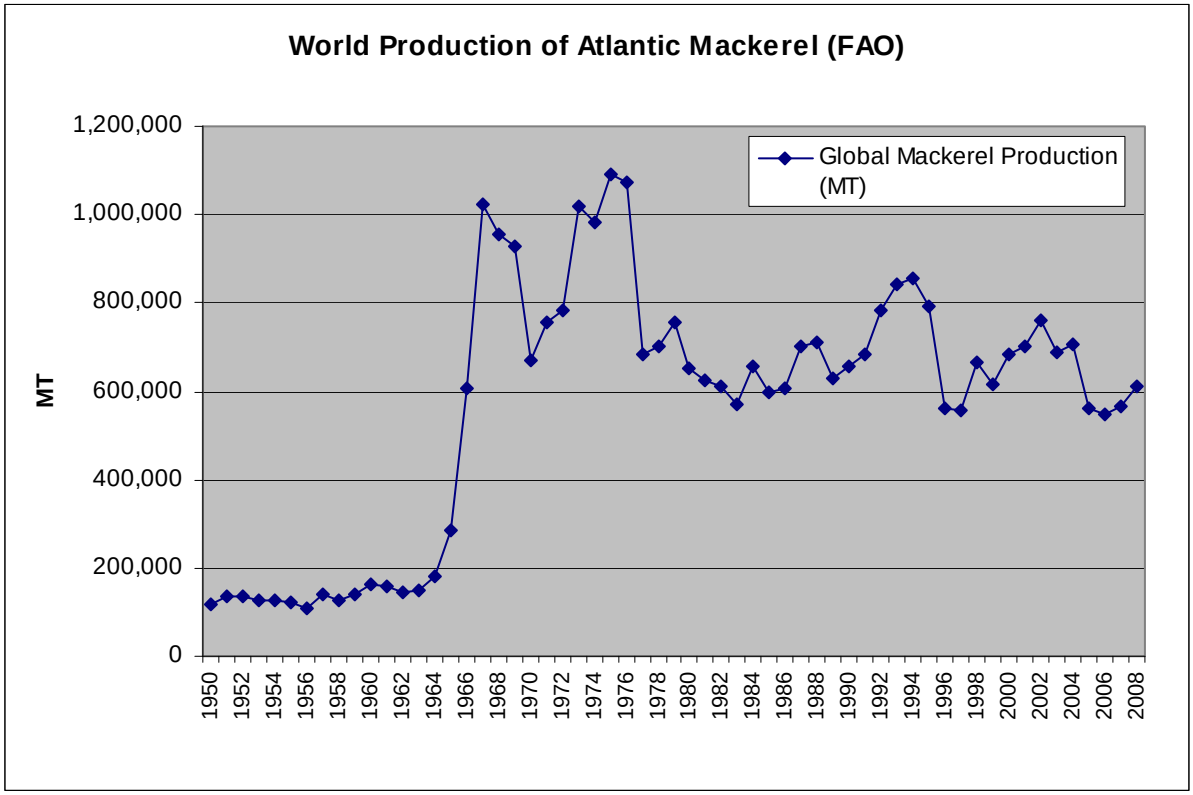


Figure 11. World production of Atlantic mackerel, 1950-2008 based on FAO (2009).

6.6.1.5.2 Future Supplies of and Demand for Mackerel

The nature of future mackerel supply depends largely on the future production of the European mackerel stock, which is much greater than the U.S./Canadian stock. European mackerel stock production fell 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). Many influences on demand however (income, tastes, competitor products) are difficult to predict.

6.6.1.5.3 US Exports of Mackerel

In 2009, US exports of all mackerel products (fresh, frozen, and prepared/preserved) totaled 17,150 mt, valued at $19.3 million. The leading markets for US exports of mackerel in 2009 (greater than 1,000 mt) were Egypt (5,032 mt), Bulgaria (2,253 mt), Canada (1,529 mt), and Georgia (1,060 mt) (*Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division: http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataProduct.html*).

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 for the last 10 years (since 2000), as estimated from the NMFS Marine Recreational Fishery Statistics Survey (MRFSS), are given in Table 12 and Table 13. In recent years, recreational mackerel harvest has varied from roughly 1,633 mt in 1997 to 530 in 2004. The highest landings occur from Massachusetts to Maine. Most Atlantic mackerel are taken from boats. Also, over the same time period approximately 10% of all mackerel caught (by number) were released.

Estimates for Atlantic mackerel recreational harvest are relatively uncertain due to low encounter rates. From 2000-2009 annual estimates had an average Proportional Standard Error (PSE) of 16%. Based on how PSEs are calculated, this means that on average we were approximately 95% sure that the real number for weight of mackerel harvest was within 32% (+ or -) of our estimate (best was ± 20%, worst was ± 47%). In addition, the uncertainty is even higher in reality because of sampling problems with MRFSS (MRIP is trying to figure out by just how much - see countmyfish.noaa.gov). Breakouts by state or mode would have greater uncertainty.

Table 12. Recreational harvest (rounded to nearest metric ton) of Atlantic mackerel by state, 2000-2009.

Year	ME	MD	MA	NH	NJ	NY	NC	RI	VA	DE	CT	Annual Total
2000	364	1	857	166	31	10	0	2	15	0	0	1,448
2001	287	22	885	224	78	18	0	7	2	13	0	1,536
2002	387	2	728	65	60	0	0	47	0	3	1	1,294
2003	123	0	510	79	29	19	0	8	1	0	0	770
2004	207	0	291	27	2	0	0	0	0	3	0	530
2005	181	0	768	74	10	0	0	0	0	0	0	1,033
2006	109	0	1,488	31	0	0	0	1	0	0	3	1,633
2007	280	0	561	43	0	0	0	0	0	0	0	884
2008	148	0	413	129	0	0	0	0	0	0	0	691
2009	320	0	155	272	0	0	0	0	0	0	0	747

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 and total, 2000-2009.

Year	PARTY-CHARTER	PRIVATE or RENTAL	SHORE	Annual Total
2000	81	1,239	127	1,448
2001	164	1,290	82	1,536
2002	23	1,172	98	1,294
2003	53	594	123	770
2004	21	395	115	530
2005	25	994	14	1,033
2006	11	1,560	62	1,633
2007	20	801	63	884
2008	9	646	35	691
2009	171	435	141	747

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 specifications are instituted 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 (2006). 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 (when *Illex* are available) are included below in Figure 12. It is important to note that the 2009 value is adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate.

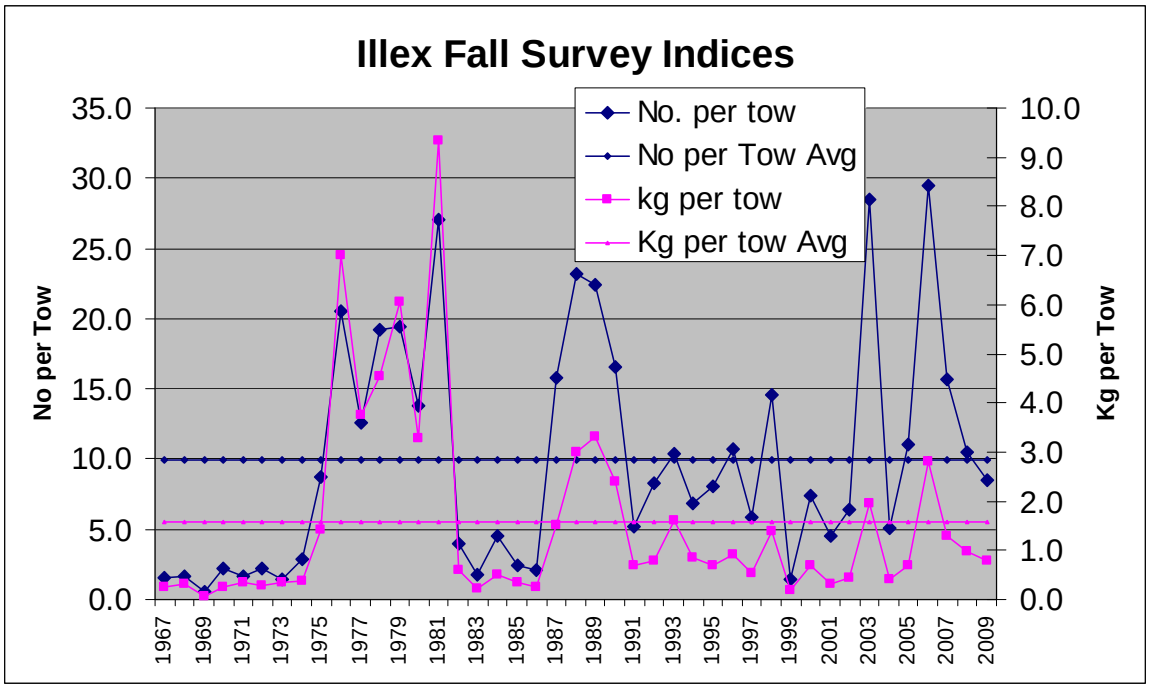


Figure 12. *Illex* Indices from NEFSC Fall survey.

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. Price (nominal) has increased fitfully since 1982 and averaged $525/mt in 2009.

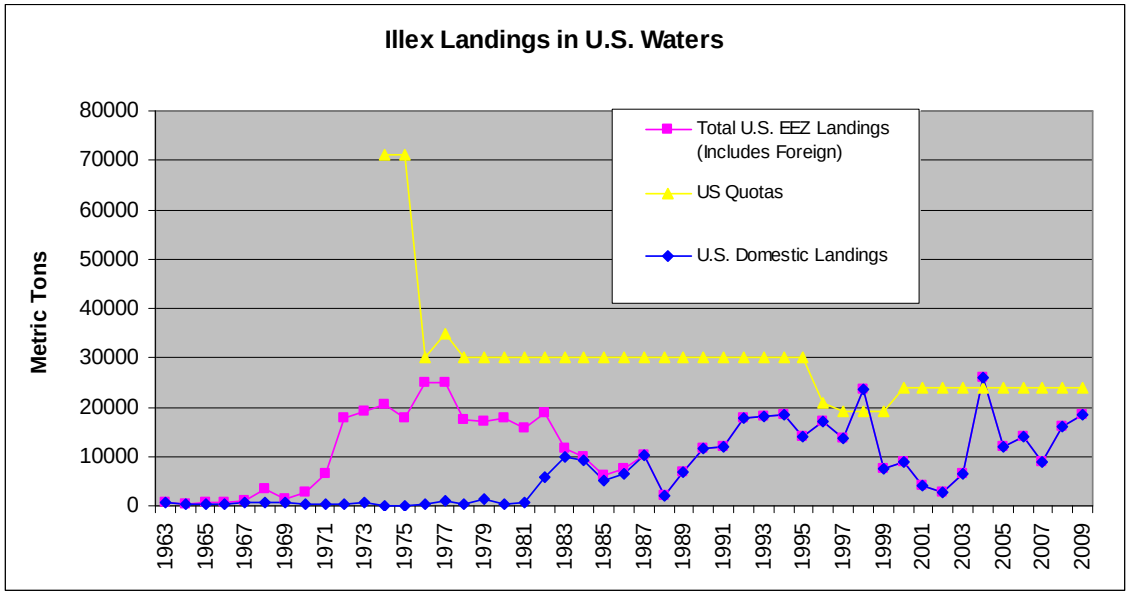


Figure 13. Landings of *Illex* in the U.S. EEZ.

Analysis of NMFS dealer weighout data 1982-2009 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) in the figures below.

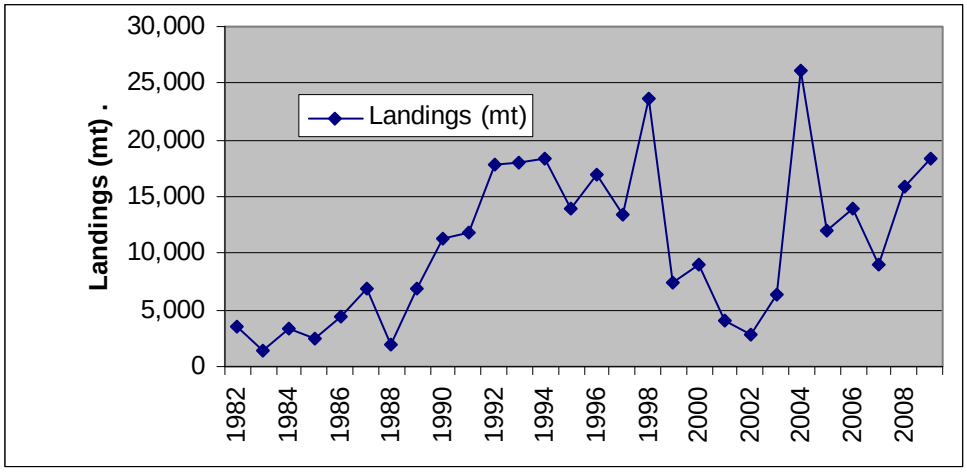


Figure 14. U.S. *Illex* landings.

Source: Unpublished NMFS dealer reports

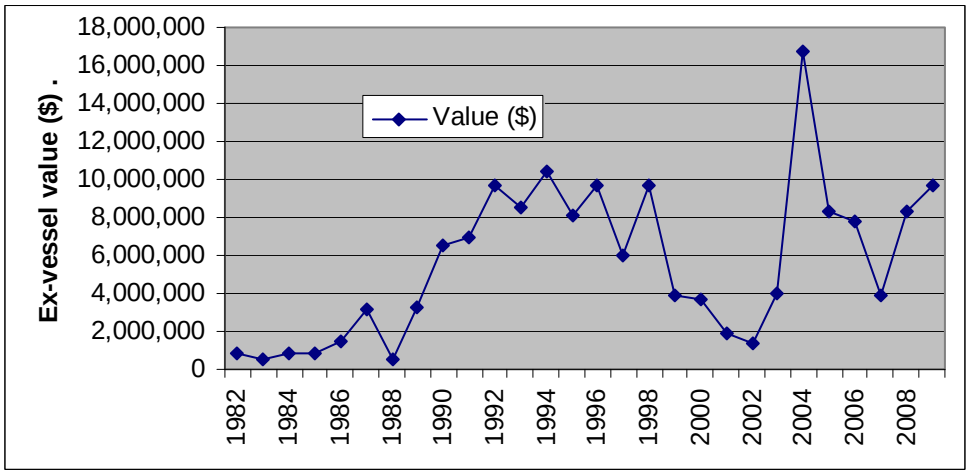


Figure 15. U.S. *Illex* ex-vessel revenues.
Source: Unpublished NMFS dealer reports

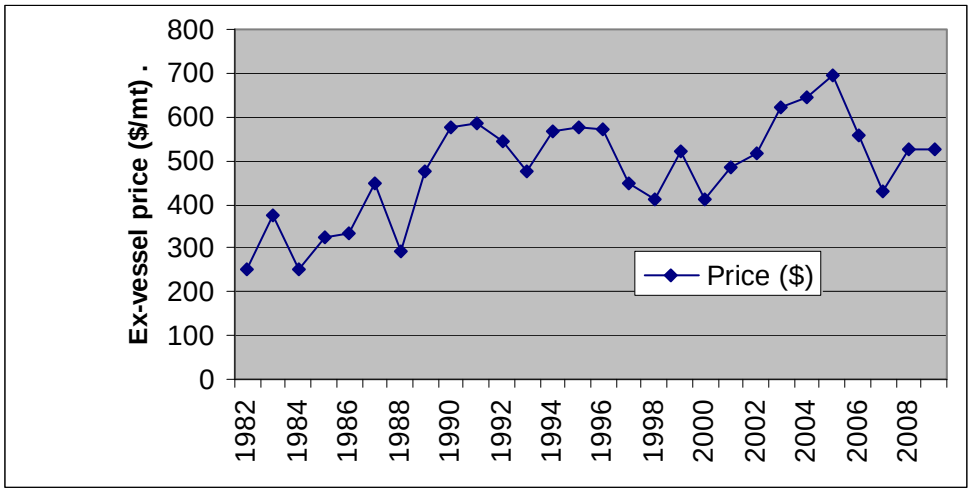


Figure 16. U.S. *Illex* ex-vessel prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage *Illex* is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 95% of the DAH is landed. Mandatory reporting for *Illex* was fully instituted in 1997 so specification performance since 1997 is most relevant. Table 14 lists the performance of the *Illex* fishery compared to its DAH. There was an overage in 1 of the last 10 years (a 9% overage in 2004) and 2 of the last 12 years (the 9% overage and a 24% overage in 1998). NMFS is continually augmenting its projecting procedures so presumably future overages would be even less likely.

Table 14. *Illex* DAH Performance. (mt)

Year	Landings	DAH	Percent of DAH Landed
1997	13,629	19,000	72%
1998	23,597	19,000	124%
1999	7,388	19,000	39%
2000	9,011	24,000	38%
2001	4,009	24,000	17%
2002	2,750	24,000	11%
2003	6,389	24,000	27%
2004	26,097	24,000	109%
2005	12,011	24,000	50%
2006	13,944	24,000	58%
2007	9,022	24,000	38%
2008	15,900	24,000	66%
2009	18,418	24,000	77%

Source: Unpublished NMFS dealer reports

6.6.2.3 2009 Commercial Fishery and Community Analysis

The following tables describe, for *Illex* in 2009, the total landings, value, numbers of vessels making landings, numbers of trips landing *Illex* (Table 15), landings by state (

Table 16), landings by month (Table 17), landings by gear (Table 18), numbers of permitted and active vessels by state (Table 19), numbers of permitted and active dealers by state (Table 20), and landings by NMFS federal permit category (Table 21). Previous Specification EA's have included port information but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 15. Total landings and value of *Illex* during 2009.
(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	$/mt
Illex	18,418	9,667,375	36	209	$525

Source: Unpublished NMFS dealer reports

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Table 16. *Illex* landings (mt) by state in 2009.

State	Landings_mt	Pct_of_Total
New Jersey	11,185	61%
Rhode Island	6,945	38%
Virginia	282	2%
Other	8	0%
Total	18,418	100%

Source: Unpublished NMFS dealer reports

Table 17. *Illex* squid landings (mt) by month in 2009.

MONTH	Landings_mt	Pct_of_Total
January	0	0%
February	0	0%
March	0	0%
April	85	0%
May	433	2%
June	2,574	14%
July	4,371	24%
August	5,574	30%
September	4,100	22%
October	1,278	7%
November	0	0%
December	3	0%
Total	18,418	100%

Source: Unpublished NMFS dealer reports

Table 18. *Illex* landings (mt) by gear category in 2009.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	17,804	97%
TRAWL,OTTER,MIDWATER	424	2%
HAND LINE, OTHER	101	1%
DREDGE, OTHER	89	0%
Other	0	0%
Total	18,418	100%

Source: Unpublished NMFS vessel trip reports

Table 19. *Illex* moratorium vessel permit holders and active vessels in 2009 by homeport state (HPST).

HPST	Permitted Vessels	Active Vessels
NJ	26	8
MA	12	3
RI	12	5
NC	7	1
NY	6	1
Other	13	0
Total	76	18

Source: Unpublished NMFS dealer reports. (Note: Table 19 active vessel numbers are less than Table 15 numbers because Table 19 only includes vessels with federal moratorium permits).

Table 20. Atlantic mackerel, squid, butterfish dealer permit holders and permitted dealers who bought *Illex* in 2009 by state.

State	Permitted Dealers	Active Dealers
MA	178	4
ME, RI, CT	168	6
NJ, NY, VA, NC	184	7
Other	91	.

Source: Unpublished NMFS dealer reports

Table 21. *Illex* landings by permit category for the period 2000-2009.

Year	Illex Moratorium Permit		Party/ Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
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	11,146	95%	0	0%	23	0%	548	5%	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
2008	15,863	100%	0	0%	1	0%	36	0%	15,900	24,000
2009	18,409	100%	0	0%	9	0%	0	0%	18,419	24,000

Source: Unpublished NMFS dealer reports

6.6.2.4 Description of the areas fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for *Illex* in 2009 by NMFS three digit statistical area (see Figure 10) are given in Table 22.

Table 22. Statistical areas from which 1% or more of *Illex* were kept in 2009 according to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
622	9108.32	52%
626	2840.38	16%
526	1698.58	10%
537	1444.72	8%
632	971.15	6%
627	737.1	4%
636	246.3	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 specifications are instituted 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 49 (2010). The SARC review panel did not accept the adequacy of the redefined BRPs or the BRPs used for stock status determination in the 2004 butterfish assessment. The review panel questioned the application of MSY theory to a short-lived recruitment-dominated population, particularly the use of equilibrium methods when trends in the data suggest the stock is declining even with low fishing mortality. It was agreed that overfishing was not likely occurring. The review panel concluded that the decline in the butterfish stock appears to be driven by environmental processes and low recruitment. Determination of an overfished versus not overfished condition was not resolved at the meeting, which left the overfished status of butterfish unknown. Final model outputs for biomass, recruitment, and fishing mortality are shown below in Figure 17, though again the SARC concluded that the final model results were only accepted in terms of reflecting the appropriate trend. Trawl survey indices are provided in figures 18 and 19. It is important to note that the 2009 value is adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate.

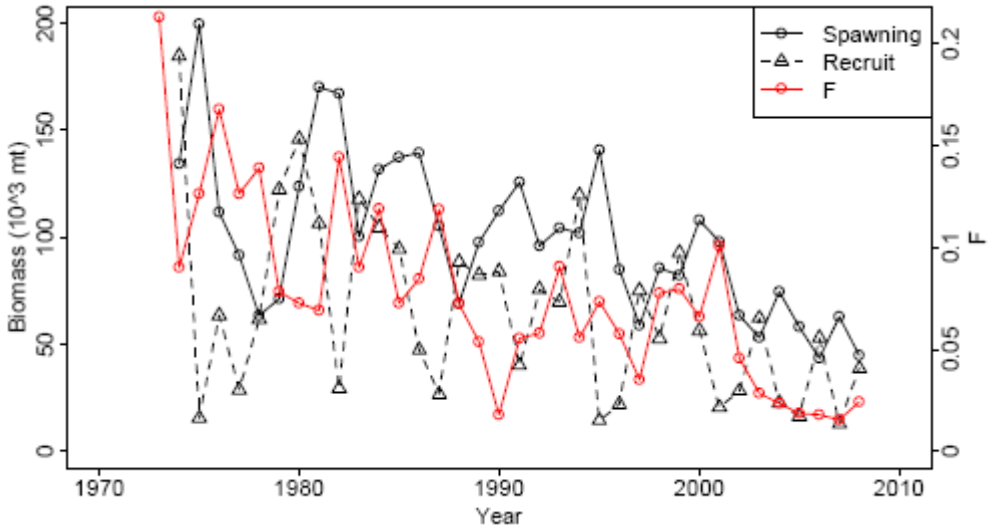

Figure 17. Butterfish recruitment and biomass.

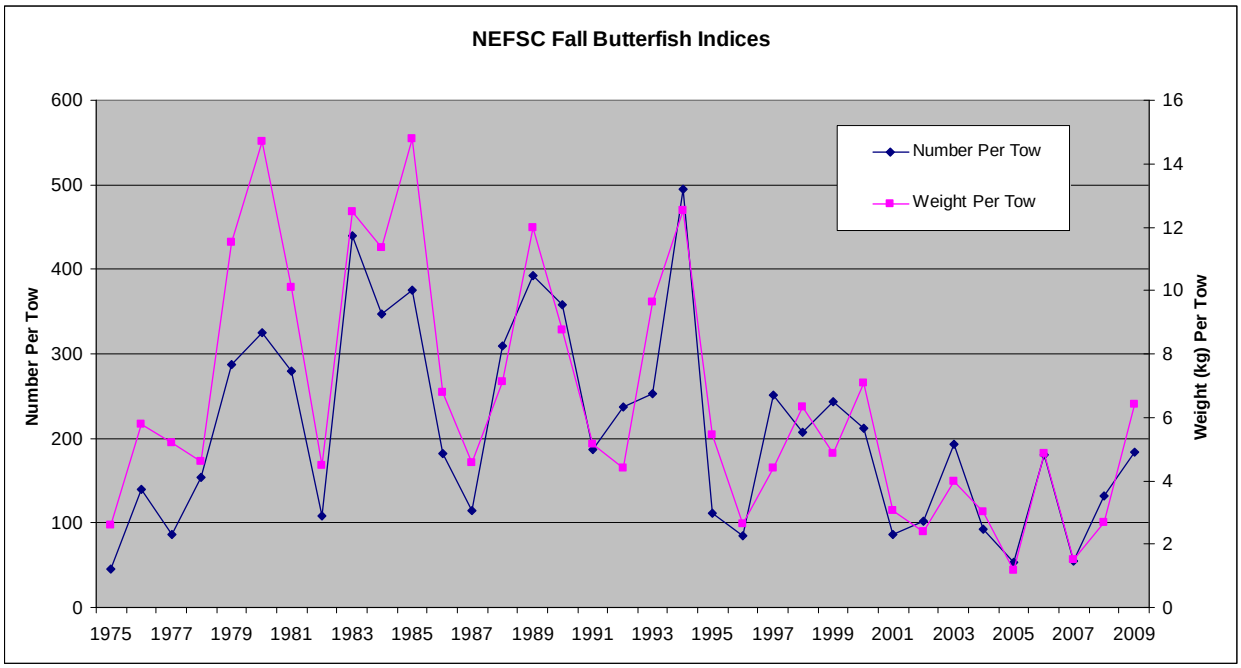

Figure 18. NEFSC fall trawl survey indices for butterfish.

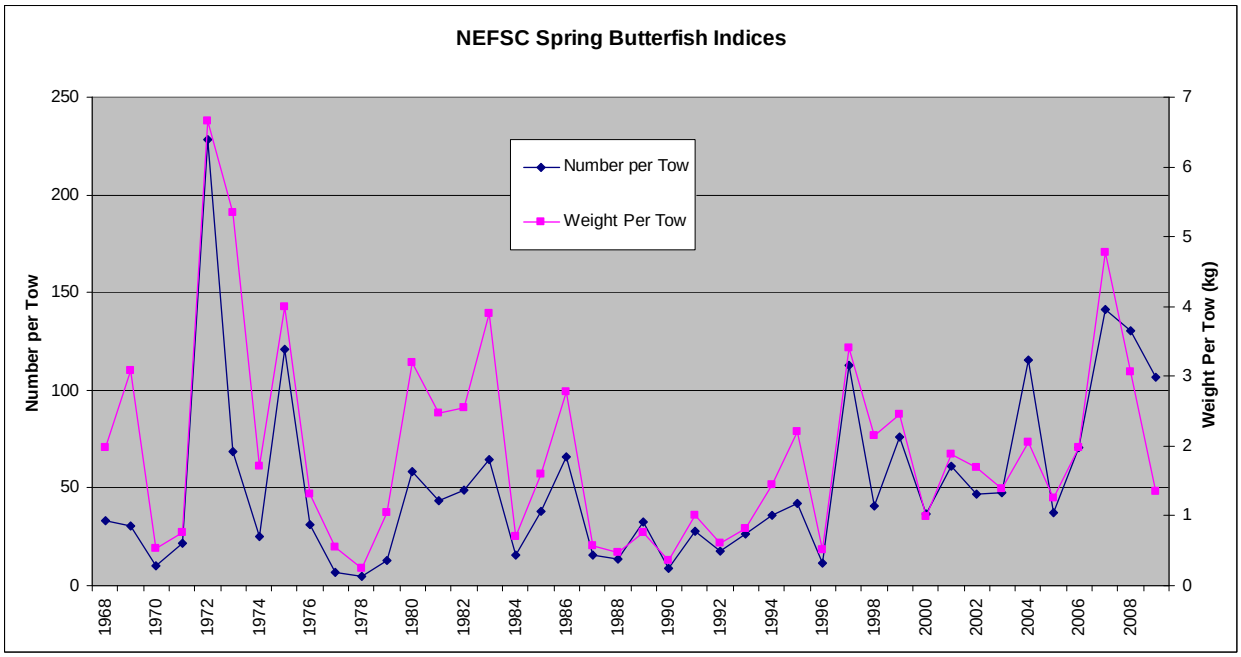

Figure 19. NEFSC spring trawl survey indices for butterfish.

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 32,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign catches declined sharply from 14,000 mt in 1976 to 2,000 mt in 1978 (Figure 20). Foreign landings were completely phased out by 1987.

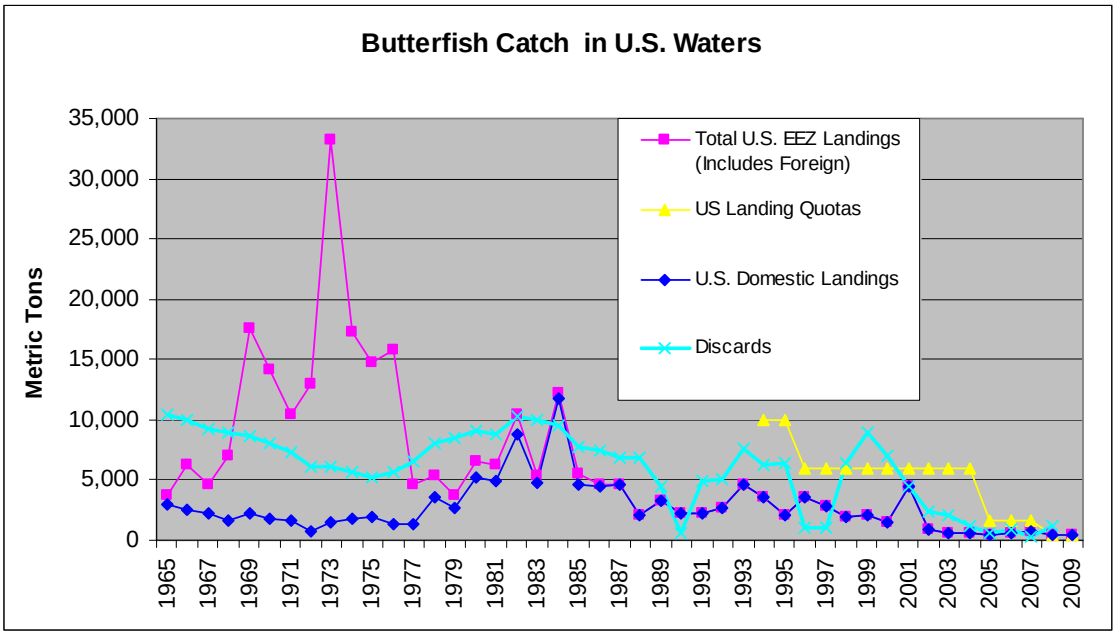

Figure 20. Landings of butterfish in the United States exclusive economic zone (mt).

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, 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. Price (nominal) has increased fitfully since 1982 and averaged $1,404/mt in 2009. Analysis of NMFS weighout data 1982-2009 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) in the figures below.

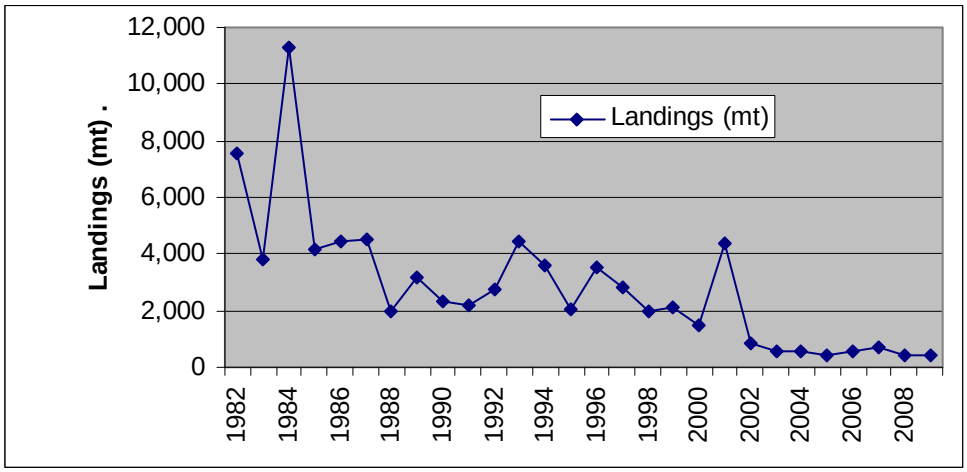

Figure 21. U.S. butterfish landings.
Source: Unpublished NMFS dealer reports

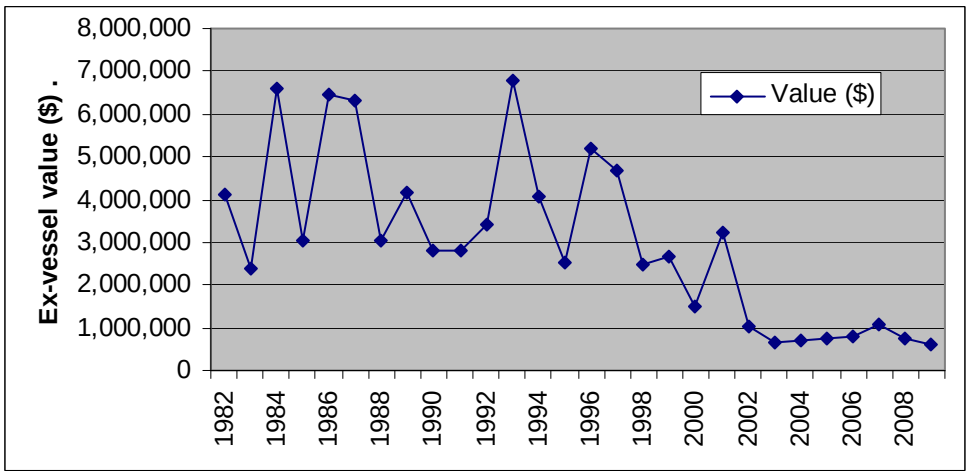

Figure 22. U.S. butterfish ex-vessel revenues.
Source: Unpublished NMFS dealer reports

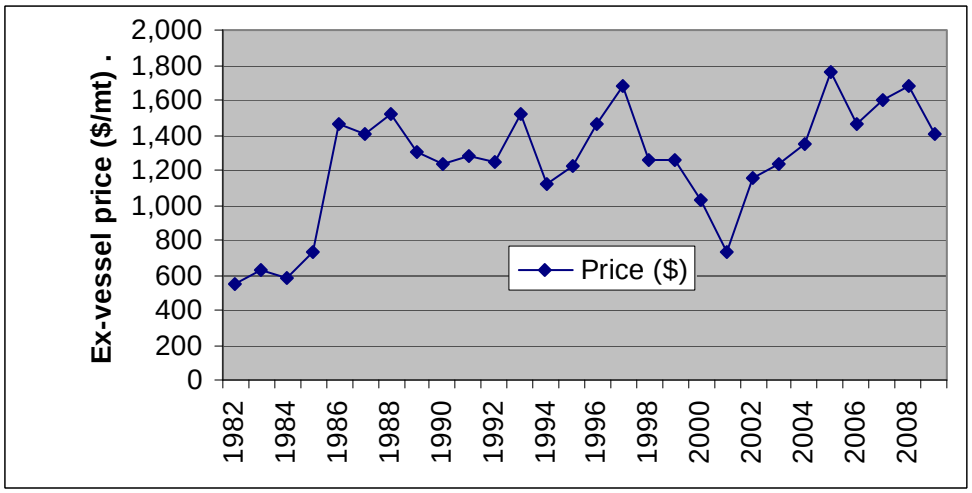

Figure 23. U.S. butterfish ex-vessel prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage butterfish landings is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 80% of the DAH is landed. Mandatory reporting for butterfish was fully instituted in 1997 so performance since 1997 is most relevant. Table 23 lists the performance of the butterfish fishery compared to its DAH. There have been no overages. There were closures in 2008 and 2009 but the closure threshold and the trip limits performed as designed and prevented an overage.

Table 23. Butterfish DAH Performance (mt)

Year	Harvest (Commercial and Recreational)	DAH	Percent of DAH Landed
1997	2,794	5,900	47%
1998	1,966	5,900	33%
1999	2,110	5,900	36%
2000	1,449	5,900	25%
2001	4,404	5,897	75%
2002	872	5,900	15%
2003	536	5,900	9%
2004	537	5,900	9%
2005	437	1,681	26%
2006	554	1,681	33%
2007	674	1,681	40%
2008	451	500	90%
2009	435	500	87%

Source: Unpublished NMFS dealer reports

6.6.3.3 2009 Commercial Fishery and Community Analysis

The following tables describe, for butterfish in 2009, 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), numbers of permitted vessels by state (Table 29), numbers of permitted dealers by state (Table 30), and landings by NMFS federal permit category (Table 31). Previous Specification EA's have included additional port information (dependence) but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 24. Total landings and value of butterfish during 2009.
(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	$/mt
Butterfish	435	610,878	311	5,049	$1,404

Source: Unpublished NMFS dealer reports

Table 25. Butterfish landings (mt) by state in 2009.

State	Landings mt	Pct of Total
Rhode Island	207	48%
New York	109	25%
Massachusetts	56	13%
Connecticut	34	8%
New Jersey	15	3%
Virginia	11	2%
New Hampshire	2	0%
Maryland	1	0%
Delaware	0	0%
Total	435	100%

Source: Unpublished NMFS dealer reports.

Table 26. Butterfish landings (mt) by month in 2009.

MONTH	Landings mt	Pct of Total
January	24	6%
February	29	7%
March	107	25%
April	38	9%
May	41	9%
June	25	6%
July	10	2%
August	17	4%
September	25	6%
October	47	11%
November	50	11%
December	22	5%
Total	435	100%

Source: Unpublished NMFS dealer reports

Table 27. Butterfish landings (mt) by gear category in 2009.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	300	69%
UNKNOWN	82	19%
DREDGE, OTHER	15	3%
TRAWL,OTTER,BOTTOM,OTHER	12	3%
POUND NET, OTHER	7	2%
GILL NET,SINK, OTHER	6	1%
OTHER	13	3%
Totals	435	100%

Source: Unpublished NMFS dealer data.

Table 28. Butterfish landings by port in 2009.

Port	State	Landings mt	Pct of Total
POINT JUDITH	RHODE ISLAND	113	26%
NORTH KINGSTOWN	RHODE ISLAND	82	19%
MONTAUK	NEW YORK	72	17%
NEW BEDFORD	MASSACHUSETTS	39	9%
EAST HAVEN	CONNECTICUT	14	3%
STONINGTON	CONNECTICUT	14	3%
AMAGANSETT	NEW YORK	14	3%
HAMPTON BAYS	NEW YORK	13	3%
NEWPORT	RHODE ISLAND	11	2%
PROVINCETOWN	MASSACHUSETTS	8	2%
BELFORD	NEW JERSEY	5	1%
CAPE MAY	NEW JERSEY	4	1%
CHINCOTEAGUE	VIRGINIA	4	1%
MATTITUCK	NEW YORK	4	1%
HAMPTON	VIRGINIA	4	1%
NIANTIC	CONNECTICUT	3	1%
OTHER BARNSTABLE	MASSACHUSETTS	3	1%
GLOUCESTER	MASSACHUSETTS	3	1%
POINT PLEASANT	NEW JERSEY	3	1%
WAINSCOTT	NEW YORK	2	1%
All others	NA	19	4%
	Total	435	100%

Source: Unpublished NMFS dealer reports

Table 29. *Loligo*/Butterfish moratorium vessel permit holders in 2009 by homeport state (HPST) and how many of those vessels were active.

HPST	Permitted Vessels	Active Vessels
MA	103	21
NJ	83	29
NY	56	38
RI	52	42
NC	22	7
ME	20	.
VA	13	1
CT	8	5
PA	3	.
MD	2	2
NH	2	.
WV	1	1
Total	365	146

Source: Unpublished NMFS dealer reports and NMFS permit database data
(Note: Table 29 active vessel numbers are less than Table 24 numbers because Table 29 only includes vessels with federal moratorium permits).

Table 30. Atlantic mackerel, squid, butterfish dealer permit holders and how many were active (bought butterfish) in 2009 by state.

State	Permitted Dealers	Active Dealers
NY	124	30
RI	52	17
MA	178	12
VA	33	8
NJ	80	7
CT	11	2
MD	18	2
NH	17	1
ME	42	0
NC	35	0
Others	31	0

Source: Unpublished NMFS dealer reports and NMFS permit database data

Table 31. Butterfish landings by permit category for the period 2000-2009.

Year	Loligo/Butterfish Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
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	5,900
2002	653	75%	0	0%	39	4%	180	21%	872	5,897
2003	367	69%	0	0%	17	3%	151	28%	536	5,900
2004	329	61%	0	0%	22	4%	186	35%	537	5,900
2005	274	63%	0	0%	13	3%	150	34%	437	5,900
2006	386	70%	0	0%	36	7%	131	24%	554	1,681
2007	535	79%	0	0%	43	6%	96	14%	674	1,681
2008	323	72%	0	0%	31	7%	97	22%	451	500
2009	334	77%	0	0%	39	9%	62	14%	435	500

Source: Unpublished NMFS dealer reports and NMFS permit database data

6.6.3.5 Description of the areas fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for butterfish in 2009 by NMFS three digit statistical area (see Figure 10 except as noted in table below) are given in Table 32.

Table 32. Statistical areas from which 1% or more of butterfish were kept in 2009 according to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
537	147.153	33%
615	47.124	10%
525	37.044	8%
611	34.49	8%
616	31.163	7%
539	29.846	7%
613	22.657	5%
526	21.134	5%
514	10.509	2%
148 (Inshore Long Island)	7.936	2%
522	6.564	1%
565	6.45	1%
562	6.009	1%
612	4.787	1%

Source: Unpublished NMFS VTR reports

6.6.4 *Loligo pealei*

6.6.4.1 Status of the stock

The *Loligo* stock is scheduled to be assessed in late 2010. The *Loligo* stock was most recently assessed at SARC 34 (2002). 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 suggested 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.

Amendment 9 implemented revised proxies for calculating fishing mortality thresholds and targets as recommended by SARC 34 (2002). The revised proxies are calculated as follows: FThreshold is the 75th percentile of fishing mortality rates during 1987 - 2000 (1.24) and FTarget is the average fishing mortality rates during the same period (0.96). These 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). In addition, the biomass target is specified to equal B_{MSY}.

SARC 34 (2002) 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 (2002) recommended that the Council maintain a catch not to exceed about 20,000 mt (to include both landings and discards). Fall index values are shown in Figure 24. It is important to note that the 2009 value is adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate.

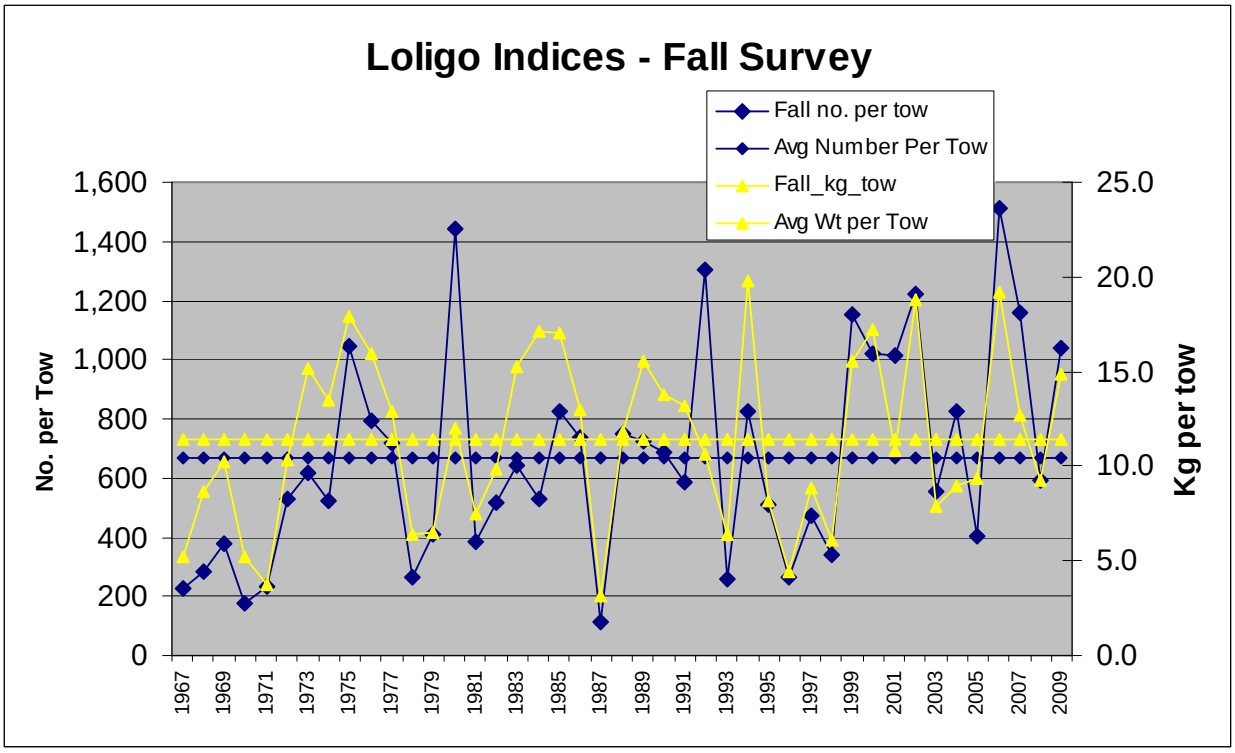

Figure 24. *Loligo* Indices from NEFSC Fall survey.

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).

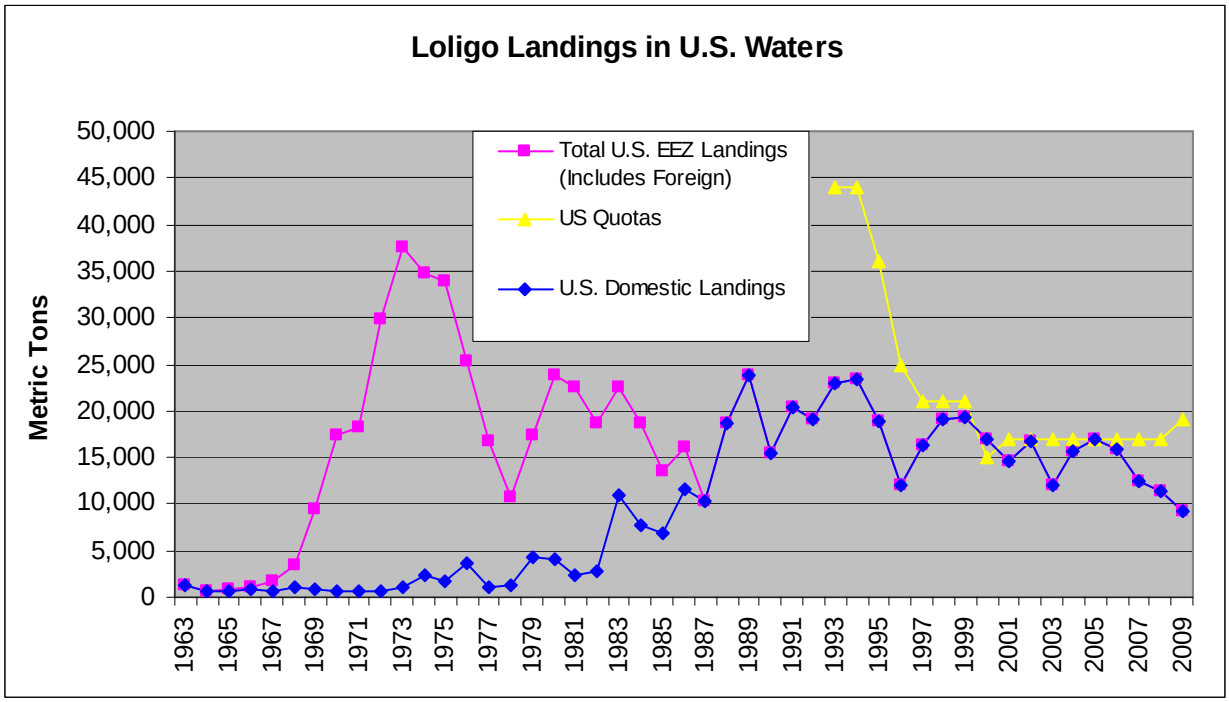

Figure 25. Landings of *Loligo* in the U.S. EEZ.

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. Price (nominal) has increased fitfully since 1982 and averaged $1,968/mt in 2009.

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 1982-2009 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) in the figures below.

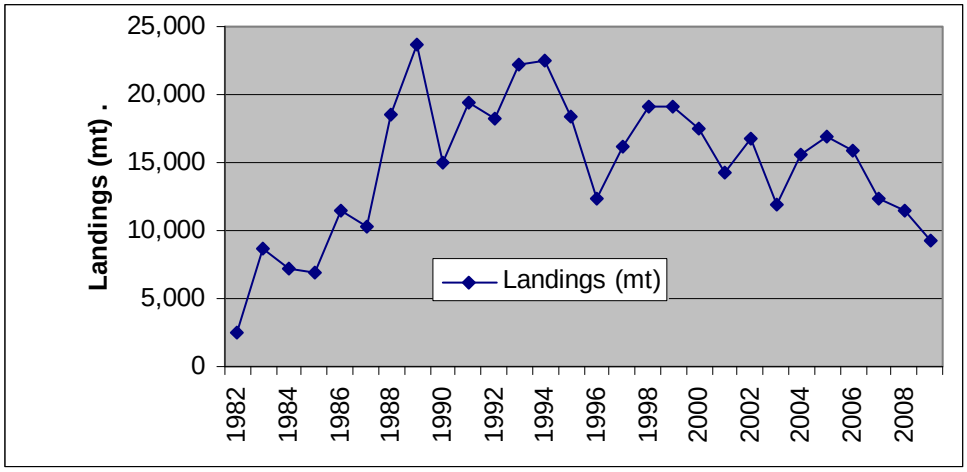

Figure 26. U.S. *Loligo* landings.
Source: Unpublished NMFS dealer reports

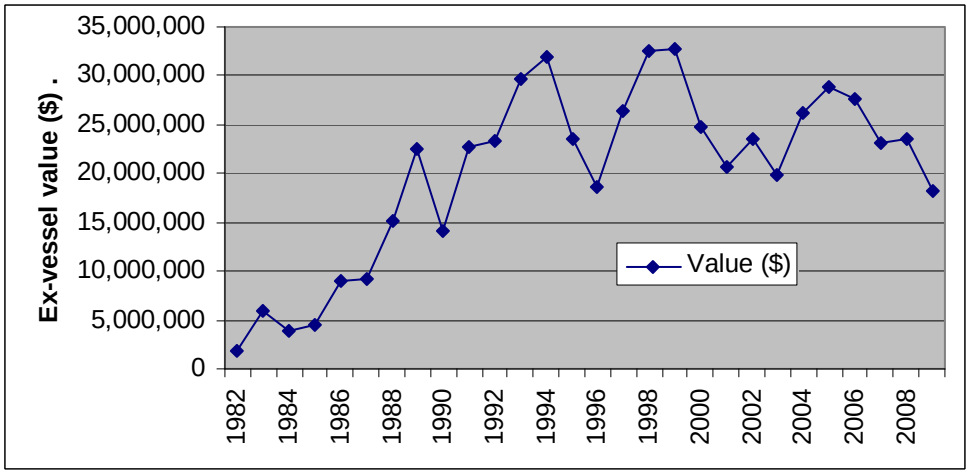

Figure 27. U.S. *Loligo* ex-vessel revenues.
Source: Unpublished NMFS dealer reports

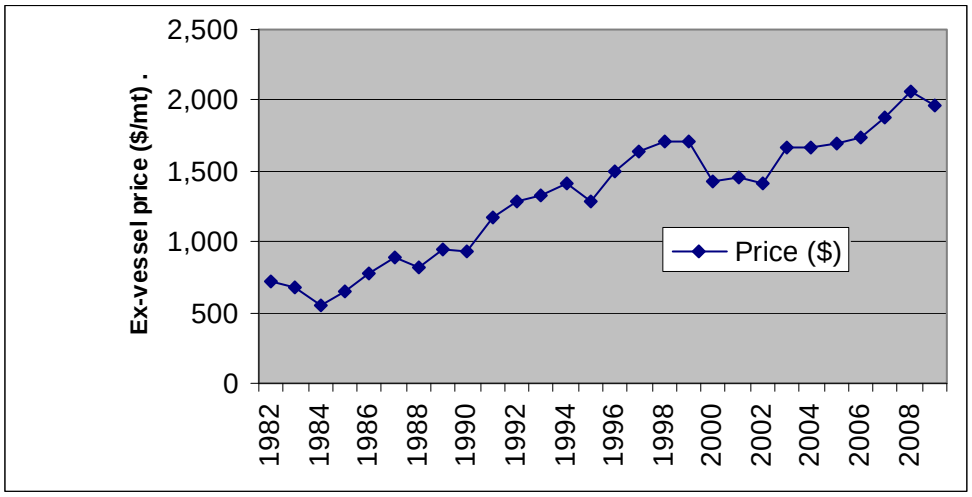

Figure 28. U.S. *Loligo* ex-vessel prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage *Loligo* is Trimester quota monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the Trimester quotas are reached in Trimesters 1 and 2 and when 95% of the annual DAH is reached in Trimester 3. Mandatory reporting for *Loligo* was fully instituted in 1997 so performance since 1997 is most relevant. Table 33 lists the performance of the *Loligo* fishery compared to its DAH. There has been one overage in the last 12 years, a 17% overage in 2000. NMFS is continually augmenting its quota projecting procedures so presumably future overages would be even less likely. There are occasional overages of the trimester quotas, but these are typically minor and should minimal effects since Trimester 1 and 2 overages are applied to Trimester 3.

Table 33. *Loligo* DAH Performance (mt)

Year	Harvest (Commercial and Recreational)	DAH	Percent of DAH Landed
1997	16,308	21,000	78%
1998	19,151	21,000	91%
1999	19,386	21,000	92%
2000	17,480	15,000	117%
2001	14,603	17,000	86%
2002	16,707	17,000	98%
2003	11,935	17,000	70%
2004	15,624	17,000	92%
2005	16,974	17,000	100%
2006	15,907	17,000	94%
2007	12,342	17,000	73%
2008	11,409	17,000	67%
2009	9,306	19,000	49%

Source: Unpublished NMFS dealer reports

As described in the alternatives, the *Loligo* DAH is currently divided up into trimesters and has been since 2007. 2000 also had Trimester management while 2001-2006 had quarterly management. 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.
2009	Aug 6 - Aug 31.

6.6.4.3 2009 Commercial Fishery and Community Analysis

The following tables describe, for *Loligo* in 2009, 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), numbers of permitted and active vessels by state (Table 39), numbers of permitted and active dealers by state (Table 40), and landings by NMFS federal permit category (Table 41). Previous Specification EA's have included additional port information (dependence) but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 34. Total landings and value *Loligo* during 2009.
(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	$/mt
Loligo	9,306	18,311,597	380	8,308	$1,968

Source: Unpublished NMFS dealer reports

Table 35. *Loligo* landings (mt) by state in 2009.

State	Landings_mt	Pct_of_Total
Rhode Island	5,054	54%
New York	1,859	20%
New Jersey	1,565	17%
Massachusetts	585	6%
Connecticut	166	2%
Virginia	63	1%
Other	14	0%
Total	9,306	100%

Source: Unpublished NMFS dealer reports

Table 36. *Loligo* squid landings (mt) by month in 2009.

MONTH	Landings_mt	Pct_of_Total
January	880	9%
February	968	10%
March	1,216	13%
April	288	3%
May	414	4%
June	778	8%
July	1,613	17%
August	438	5%
September	387	4%
October	1,568	17%
November	560	6%
December	195	2%
Totals	9306	100%

Source: Unpublished NMFS dealer reports

Table 37. *Loligo* landings (mt) by gear category in 2009.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	7,857	84%
UNKNOWN	1,027	11%
DREDGE, OTHER	192	2%
TRAWL,OTTER,MIDWATER	88	1%
TRAWL,OTTER,BOTTOM,OTHER	69	1%
Other	75	1%
Totals	9,306	100%

Source: Unpublished NMFS dealer reports

Table 38. *Loligo* landings by port in 2009.

Port	State	Landings mt	Pct of Total
POINT JUDITH	RHODE ISLAND	4,191	45%
CAPE MAY	NEW JERSEY	1,387	15%
MONTAUK	NEW YORK	1,155	12%
NORTH KINGSTOWN	RHODE ISLAND	734	8%
HAMPTON BAYS	NEW YORK	582	6%
OTHER BARNSTABLE	MASSACHUSETTS	250	3%
NEW BEDFORD	MASSACHUSETTS	221	2%
NEWPORT	RHODE ISLAND	117	1%
POINT PLEASANT	NEW JERSEY	107	1%
BELFORD	NEW JERSEY	70	1%
STONINGTON	CONNECTICUT	63	1%
OTHER CONNECTICUT	CONNECTICUT	50	1%
POINT LOOKOUT	NEW YORK	45	0%
HARWICHPORT	MASSACHUSETTS	33	0%
Others	NA	300	3%
Total	NA	9,306	100%

Source: Unpublished NMFS dealer reports

Table 39. *Loligo*-butterfish moratorium vessel permit holders in 2009 by homeport state (HPST) and how many of those vessels were active (landed *Loligo*)

HPST	Permitted Vessels	Active Vessels
MA	103	25
NJ	83	45
NY	56	42
RI	52	44
NC	22	13
ME	20	0
VA	13	1
CT	8	6
PA	3	1
MD	2	2
NH	2	0
WV	1	1
Total	365	180

Source: Unpublished NMFS dealer reports

(Note: Table 39 numbers are less than Table 34 numbers because Table 39 only includes vessels with federal moratorium permits)

Table 40. Atlantic mackerel, squid, butterfish dealer permit holders by state and how many were active (bought *Loligo*) in 2009 by state.

State	Permitted Dealers	Active Dealers
NY	124	38
RI + CT	63	21
MA	178	18
NC	35	12
NJ	80	9
VA + MD	51	7
ME + NH	59	4
Other	31	0
Total	621	109

Source: Unpublished NMFS dealer reports

Table 41. *Loligo* landings by permit category for the period 2000-2009.

Year	Loligo/Butterfish		Party/Charter		Incidental		No Permit/		Total	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
2000	16,280	93%	0	0%	393	2%	802	5%	17,475	15,000
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	14,166	91%	0	0%	159	1%	1,298	8%	15,623	17,000
2005	15,325	90%	11	0%	73	0%	1,564	9%	16,972	17,000
2006	14,318	90%	0	0%	294	2%	1,295	8%	15,907	17,000
2007	11,352	92%	0	0%	230	2%	760	6%	12,343	17,000
2008	10,748	94%	0	0%	264	2%	397	3%	11,409	17,000
2009	8,645	93%	0	0%	228	2%	434	5%	9,307	19,000

Source: Unpublished NMFS dealer reports and Permit database

6.6.4.5 Description of areas fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for *Loligo* in 2009 by NMFS three digit statistical area (see Figure 10 except as noted in table below) are given in Table 42.

Table 42. Statistical areas from which 1% or more of *Loligo* were kept in 2009 according to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
537	2344.86	24%
616	1637.11	17%
622	1530	16%
613	831.06	9%
626	619.09	6%
612	477.84	5%
539	328.58	3%
632	302.06	3%
623	232.79	2%
538	201.57	2%
611	185.17	2%
166 (inshore Long Island)	171.96	2%
615	115.25	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

The three alternatives considered for 2011 are fully described in section 5.1 and are summarized parenthetically in the Managed Resource Impact section below. Changes to measures other than specifications were not considered. For 1b the Regional Administrator can increase the IOY up to, but not to exceed, the ABC specification if applicable 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.

Managed Resource

1a (preferred, intermediately restrictive, ABC = 47,395, IOY=DAH = 46,779, DAP = 31,779, Rec = 15,000). Given 2007-2009 catches were lower than the proposed 1a specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 1a would likely restrict total (U.S. and Canadian) catch to 80,000 mt, which is the recommendation of both the recent mackerel TRAC assessment and the MAFMC's SSC, so 1a's specifications should be generally protective of the mackerel stock and more protective than the status quo (211,000 mt total). Since the recent mackerel TRAC assessment was unable to determine the status of mackerel, there is relatively high uncertainty regarding the effects of any given catch level, but 1a's specifications do represent a total ABC reduction from a 211,000 mt total (U.S. and Canadian) last year to 80,000 mt this year (a 62% reduction).

1b (status quo, no action, least restrictive, ABC=156,000mt; IOY=DAH= 115,000mt; DAP=100,000mt; REC = 15,000mt). Given 2007-2009 catches were lower than the proposed 1b specifications impacts are expected to be similar to the prior fishing year. Since these specifications are substantially higher than 2007-2009 catches (which were about 23,400mt to 26,400mt), if environmental and/or market conditions were favorable to increased catch, 1b would not restrict total (U.S. and Canadian) catch to 80,000 mt, which is the recommendation of both the recent mackerel TRAC assessment and the MAFMC's SSC. Therefore, 1b's specifications, while maintaining the status quo, might not be generally protective of the mackerel stock.

1c (most restrictive, ABC=38,444mt; IOY=DAH= 37,944mt; DAP=22,944 mt; REC = 15,000mt). Given 2007-2009 catches were lower than the proposed 1c specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 1c would likely restrict total (U.S. and Canadian) catch to 80,000 mt, which is the recommendation of both the recent mackerel TRAC assessment and the MAFMC's SSC, so 1a's specifications should be generally protective of the mackerel stock and more protective than the status quo (211,000 mt total). Given the higher assumption about 2011

Canadian catch used for 1c compared to 1a, 1c may be even more protective of the mackerel stock than 1a, but both appear likely to constrain total catch to 80,000 mt. Since the recent mackerel TRAC assessment was unable to determine the status of mackerel, there is relatively high uncertainty regarding the effects of any given catch level, but 1c's specifications do represent a total ABC reduction from a 211,000 mt total (U.S. and Canadian) last year to 80,000 mt this year, a 62% reduction.

Predator-Prey (Forage) Considerations

Impacts are expected to be similar to the prior fishing year. Since none of the alternatives are expected to adversely impact abundance of the managed resource compared to the status quo, none are expected to negatively affect the various species and stocks of marine mammals, birds, and fish that prey on the managed resource compared to the status quo. Predator-prey interactions were also considered in the latest assessment. The Council considered that specifications could be additionally reduced beyond other factors because of predator-prey considerations but decided that such considerations were sufficiently incorporated in the SSC's ABC recommendations.

Non-Target Species

The primary species taken incidentally and discarded in the directed mackerel fishery over the most recent five years of data (2005-2009) are listed in Table 43. The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. Presumably some criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal. Thus to begin this process, staff first reviewed 2005-2009 trips in the dealer weighout database to see if a certain trip definition could account for most mackerel landed. The result of this review resulted in the following definition for mackerel trips using landings: All trips that had at least 50% mackerel by weight and 45,000 pounds mackerel AND those trips 33%-50% mackerel by weight but over 100,000 pounds mackerel. The general idea is to include significant landings that are over 50% mackerel and also those larger landings that might not have been quite 50% mackerel. This definition results in capturing 96% of all mackerel landings in the dealer weighout database 2005-2009 and was applied to the observer database to examine discards in the "mackerel fishery." The resulting set of trips in the observer database included ten on average for each year 2005-2009. Information for species (99.7% of all discards) that make up most discards on these trips is presented in Table 43. Some co-directing occurs with mackerel and Atlantic herring, so the high Atlantic herring numbers to some extent are not the result of bycatch so much as directed fishing for both on the same trip. This also means that some of the discards described below may be related to directed herring fishing rather than directed mackerel fishing, but given the co-directing that occurs it is very difficult to fully disentangle the two. Regarding the 4% of mackerel landings that are not captured in the trip definition, on the relevant identifiable trips 2005-2009 (some of the 3% are not identifiable because they are "lumped" state reports), a wide variety of species were landed (dealer weighout database) with Atlantic herring, *Loligo*, and silver hake making up the majority of landings on these trips (and each were individually larger

than the mackerel landings), further suggesting that the chosen definition of a "mackerel trip" is appropriate for the purpose of bycatch/discard descriptions.

While a very rough estimate, especially given the low observer coverage in small mesh fisheries and non-accounting for gear, spatial, or temporal trends, one can use the information in Table 43 and the fact that about 34,240 MT of mackerel were caught annually 2005-2009 to generally and very roughly estimate annual incidental catch for the ten species in the table. For example in **Table 43**, since there were about 34,240 MT of mackerel caught annually (landings scaled up to account for 1.3% mackerel discarding), and for every MT of mackerel caught there are 4.7 pounds of scup caught (4th Column from left), the mackerel fishery may have caught about 161,000 pounds of scup per year 2005-2009. This is the last column in Table 43 and while the information is provided, readers are strongly cautioned that while this is a reasonable approach for a general, rough, and relative estimate given the available data, it is highly imprecise. Note also that even the estimates that can be calculated would only really be valid for the 96% of landings captured by the chosen directed mackerel trip definition. It is even more difficult to assess the other 4% because to some degree the mackerel itself is being caught incidental to other fisheries. Nonetheless, the mackerel-to-other-species ratios were scaled up to the 100% of mackerel caught to keep things relatively simple.

The discards of large pelagics in the Atlantic mackerel fishery are generally unknown due to the inability of the observers to view these discards because of the pumping of fish that occurs from codend to hold; large-bodied species are prevented from entering the pump (the pump sends the catch directly from the codend into the hold) and are discarded while the codend is submerged.

Table 43. Key species taken and discarded in directed trips for Atlantic mackerel, based on unpublished NMFS Northeast Fisheries Observer Program data and unpublished dealer weighout data from 2005-2009. (see text for criteria). There are 2204.6 pounds in one metric ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of mackerel caught, pounds of given species caught.	For every metric ton of mackerel caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Mackerel Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year average of mackerel catch (34,240 mt)
Directed Mackerel Trip Bycatch and Discards								
DOGFISH, SPINY	152,023	144,625	16.7	15.9	0.72%	39%	95%	571,388
HERRING, ATLANTIC	2,281,771	91,401	250.5	10.0	0.46%	25%	4%	8,576,157
MACKEREL, ATLANTIC	20,083,906	62,114	2,204.6	6.8	0.31%	17%	0%	NA
SCUP	42,889	42,889	4.7	4.7	0.21%	12%	100%	161,199
FISH, NK	9,991	9,985	1.1	1.1	0.05%	3%	100%	37,552
HERRING, BLUEBACK	65,779	8,955	7.2	1.0	0.04%	2%	14%	247,233
BASS, STRIPED	2,380	2,380	0.3	0.3	0.01%	1%	100%	8,945
SHAD, HICKORY	1,745	1,730	0.2	0.2	0.01%	0%	99%	6,559
HAKE, SILVER (WHITING)	7,831	1,001	0.9	0.1	0.01%	0%	13%	29,434
SHAD, AMERICAN	3,352	699	0.4	0.1	0.00%	0%	21%	12,598
ALEWIFE	19,250	642	2.1	0.1	0.00%	0%	3%	72,352
DOGFISH, NK	500	500	0.1	0.1	0.00%	0%	100%	1,879
BUTTERFISH	7,405	403	0.8	0.0	0.00%	0%	5%	27,831

For non-target species that are managed under their own fishery management plan, incidental catch/discards are also considered as part of the management of that fishery. These species will be impacted to some degree by the prosecution of the Atlantic mackerel fishery. However, the range of specifications considered (see below) is not expected to increase or re-distribute fishing effort by gear type.

1a - Given 2007-2009 catches were lower than the proposed 1a specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 1a would likely restrict total (U.S. and Canadian) landings to 80,000 mt, which is less than the status quo specifications would allow. With less effort there would likely be less non-target species impacts compared to if the status-quo specifications had been in place. However mackerel landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort.

1b - Given 2007-2009 catches were lower than the proposed 1b specifications, impacts are expected to be similar to the prior fishing year. 1b, while the status quo, could allow substantially more effort and therefore more non-target species impacts compared to how the fishery operated the previous year if environmental and/or market conditions were favorable to substantially increased catch. However, the impacts would be related to the change in environmental/market conditions, not the setting of specifications.

1c - Given 2007-2009 catches were lower than the proposed 1c specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 1c would likely restrict total (U.S. and Canadian) landings to 80,000 mt, which is less than the status quo specifications would allow. With less effort there would likely be less non-target species impacts compared to if the status-quo specifications had been in place. 1c would be likely to result in the lowest effort and therefore lowest non-target species impacts due to the lower U.S. DAH specifications. However mackerel landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort.

7.1.2 Habitat Impacts

This fishery is prosecuted primarily with mid-water trawls, which do not contact the seabed. About 30% of the mackerel harvested were caught with bottom trawl gear in 2009. The status quo alternative, 1b, would not be expected to change habitat impacts compared to how the fishery was prosecuted in the prior fishing year. 1a (preferred) and 1c, with lower DAH's, could benefit habitat if the DAH constrained effort compared to what would happen under the status quo. However mackerel landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort – in the case of habitat impacts, bottom trawling.

7.1.3 Impacts on Endangered and Other Protected Species

Section 6.4 describes the available information on interactions between the mackerel fishery and endangered and other protected species. Since the mackerel fishery overlaps with some marine mammal distributions, some marine mammal interactions are possible with the species highlighted in Section 6.4. The distribution of sea turtles also overlaps with the operation of the Atlantic mackerel fishery. 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 and no interactions have been observed. Leatherbacks generally do not prey on fish (see Section 6.4 for references) and are unlikely to be attracted to operations of this fishery. While consumption of Atlantic mackerel by Loggerheads has been documented, loggerheads do not generally target fast-moving fish such as mackerel (Dodd 1988). Thus, interactions between sea turtles and the Atlantic mackerel fishery are not anticipated.

The status quo alternative, 1b, would not be expected to change protected resource impacts compared to how the fishery was prosecuted in the previous fishing year. 1a (preferred) and 1c, with lower DAH's, could benefit protected resources if the DAH constrained effort compared to what would happen under the status quo. However mackerel landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort and therefore protected resource impacts.

7.1.4 Impacts on Human Communities

Short Term (2011)

In the short term, the status quo alternative, 1b, would not be expected to change impacts on human communities compared to how the fishery was prosecuted in 2010. 1a (preferred) and 1c, with lower DAH's, could result in lower effort and landings and therefore revenues if the DAH became constraining compared to what would happen under the status quo specifications. However mackerel landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort and landings, and therefore revenues. Other than differences in how much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

Long Term

The status quo alternative, 1b, may not be sufficiently protective of the mackerel stock given the uncertainty and indications of lower productivity described in the 2010 TRAC mackerel assessment. While the same is true regarding 1a and 1c, since they will result in lower catches they would be more protective of the mackerel stock and more likely to preserve the socio-economic benefits associated with a healthy mackerel stock. Other than differences in how

much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

TALFF/JVP

The MSA 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 adjustments of the specifications in recent years. Therefore, the Council concluded that no surplus exists between the US portion of the sustainable yield from this stock and the IOY for 2011. 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, recreation, and 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 resulting 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. This conclusion is reinforced by downward adjustments to the specifications. The Council received testimony from processors and harvesters that the shore side processing sector of this industry has been under going 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 expansion in shore side processing capacity in recent years and relatively low specifications, the Council concluded that shore side processing capacity was no longer a limiting factor relative to domestic production of Atlantic mackerel.

7.2 Impacts of Alternatives for *Illex*

7.2.1 Biological Impacts on Managed Resource and Non-Target Species

The three alternatives considered for 2011 are fully described in section 5.2 and are summarized parenthetically in the Managed Resource Impact section below. Changes to measures other than specifications were not considered. Also, up to 3% of the IOY may be set aside for scientific research.

Managed Resource

2a (preferred, intermediately restrictive, ABC=24,000, IOY=DAH= DAP = 23,328mt). Given 2007-2009 catches were lower than the proposed 2a specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 2a would likely restrict catch to 24,000 mt, which is the recommendation of the MAFMC's SSC, so 2a's specifications should be generally protective of the *Illex* stock and more protective than the status quo (24,000 mt DAH, i.e. landings). Discards have not been previously been deducted. While the last assessment estimated that discards are relatively low, they have been deducted per the information in that assessment (NEFSC 2006), which is why the IOY in 2a is lower than that of 2b, the status quo. This would likely have a positive but minimal impact on the *Illex* stock compared to the status quo specifications.

2b (status quo, no action, least restrictive, Max OY= ABC=IOY=DAH=DAP = 24,000mt). Given 2007-2009 catches were lower than the SSC recommended 24,000 mt ABC, even though 2b does not account for discards like 2a or 2c, impacts are expected to be similar to the prior fishing year. However, if environmental and/or market conditions were favorable to increased catch, 2b would not restrict total catch to 24,000 mt, which is the recommendation of the MAFMC's SSC, so 2b's specifications might not be generally protective of the *Illex* stock.

2c (most restrictive, ABC=24,000, IOY=DAH= DAP = 22,656 mt). Given 2007-2009 catches were lower than the proposed 2c specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 2c would likely restrict catch to 24,000 mt, which is the recommendation of the MAFMC's SSC, so 2c's specifications should be generally protective of the *Illex* stock and more protective than the status quo (24,000 mt DAH, i.e. landings). Discards have not been previously deducted. While the last assessment estimated that discards are relatively low, they have been deducted at a rate twice that indicated in that assessment (NEFSC 2006) given the uncertainty of the discard estimate and to create a reasonable range for NEPA purposes. Thus the IOY in 2c is lower than that of 2b or 2a. This would likely have a positive but minimal impact on the *Illex* stock compared to the status quo specifications.

Predator-Prey (Forage) Considerations

Impacts are expected to be similar to the prior fishing year. Since none of the alternatives are expected to adversely impact abundance of the managed resource compared to the status quo, none are expected to negatively affect the various species and stocks of marine mammals, birds, and fish that prey on the managed resource compared to the status quo. The Council considered that specifications could be additionally reduced beyond other factors because of predator-prey considerations but decided that such considerations were sufficiently incorporated in the SSC's ABC recommendations.

Non-Target Species

The primary species taken incidentally and discarded in the directed *Illex* fishery over the most recent five years of data (2005-2009) are listed in Table 44.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. Presumably some criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal. Thus to begin this process, staff first reviewed 2005-2009 trips in the dealer weighout database to see if a certain trip definition could account for most *Illex* landed. The result of this review resulted in the following definition for *Illex* trips using landings: All trips that had at least 50% *Illex* by weight. This definition results in capturing 99% of all *Illex* landings in the dealer weighout database 2005-2009 and was applied to the observer database to examine discards in the *Illex* fishery. The resulting set of trips in the observer database included 14 on average for each year 2005-2009. Information for the species (99% of all discards) that make up most discards on these trips is presented in Table 44. Readers will note the surge in FISH, NK. This was caused by one haul in 2009 that was to big to bring aboard a vessel and some had to be dumped because some net sensors failed. While it had to be recorded as FISH, NK, the observer's log suggests that it was mostly squid ("Unknown as to how much was released, but observer saw a swordfish come out along with the squid."). Also, of the 75,042 pounds that did come aboard from this haul, the observer recorded only 42 pounds of *Illex* discarded and no other species observed.

While a very rough estimate, especially given the low observer coverage in small mesh fisheries and non-accounting for spatial and temporal trends, one can use the information in Table 44 and the fact that about 14,258 mt of *Illex* were caught annually 2005-2009 to generally and very roughly estimate annual incidental catch for the species in the table. This is the last column in Table 44 and while the information is provided, readers are strongly cautioned that while this is a reasonable approach for a general, rough, and relative estimate given the available data, it is highly imprecise. Note also that even the estimates that can be calculated would only really be valid for the 99% of landings captured by the chosen directed *Illex* trip definition. It is even more difficult to assess the other 1% because to some degree the *Illex* itself is being caught incidental to other fisheries. Nonetheless, the *Illex*-to-other-species ratios were scaled up to the 100% of *Illex* caught to keep things relatively simple.

For non-target species that are managed under their own fishery management plan, incidental catch/discards are also considered as part of the management of that fishery. None of the alternatives are expected to increase or re-distribute fishing effort by gear type in 2011. Given 2007-2009 catches were lower than the proposed 2a (preferred) and 2c specifications impacts are expected to be similar to the prior fishing year even though they propose lower DAHs. If environmental and/or market conditions were favorable to increased catch however, 2a and 2c would result in a slightly smaller catch than the status quo, 2b, and presumably slightly less effort. With less effort there would likely be less non-target species impacts compared to if the status-quo specifications had been in place. However *Illex* landings have not yet been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort. Regardless, the *Illex* fishery appears to have relatively insignificant levels of incidental catches (see Tables below).

Table 44. Key species taken and discarded in directed trips for *Illex*, based on unpublished NMFS Northeast Fisheries Observer Program data and unpublished dealer weighout data from 2005-2009 (see text for criteria). There are 2204.6 pounds in one metric ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of Illex caught, pounds of given species caught.	For every metric ton of Illex caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Illex Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year average of Illex landings (14,258 mt)
Directed Illex Trip Bycatch and Discards								
SQUID, SHORT-FIN	13,169,851	234,700	2,204.6	39	1.81%	69.3%	2%	NA
FISH, NK	25,753	25,753	4.3	4	0.20%	10.0%	100%	61,468
BUTTERFISH	36,309	23,168	6.1	4	0.18%	6.6%	64%	86,663
HAKE, SPOTTED	13,819	13,668	2.3	2	0.11%	2.6%	99%	32,984
DOGFISH, SPINY	10,429	10,427	1.7	2	0.08%	1.7%	100%	24,891
SQUID, ATL LONG-FIN	65,979	5,330	11.0	1	0.04%	1.5%	8%	157,480
DORY, BUCKLER (JOHN)	6,683	4,997	1.1	1	0.04%	1.1%	75%	15,952
HAKE, SILVER (WHITING)	4,558	3,625	0.8	1	0.03%	1.0%	80%	10,879
BEARDFISH	3,346	3,331	0.6	1	0.03%	1.0%	100%	7,986
HAKE, NK	3,298	3,298	0.6	1	0.03%	0.7%	100%	7,871
MONKFISH (ANGLER, GOOSEFISH)	8,627	1,383	1.4	0	0.01%	0.7%	16%	20,591
DOGFISH, SMOOTH	1,257	1,257	0.2	0	0.01%	0.4%	100%	3,001
HAKE, RED (LING)	1,208	1,208	0.2	0	0.01%	0.4%	100%	2,884
FLOUNDER, FOURSPOT	1,158	1,158	0.2	0	0.01%	0.3%	100%	2,764
SKATE, LITTLE	974	974	0.2	0	0.01%	0.3%	100%	2,325
WHITING, BLACK (HAKE, OFFSHORE)	658	658	0.1	0	0.01%	0.3%	100%	1,571
HADDOCK	582	582	0.1	0	0.00%	0.2%	100%	1,388
SQUID, NK	550	550	0.1	0	0.00%	0.2%	100%	1,313
BONE, NK	425	425	0.1	0	0.00%	0.2%	100%	1,014
CRAB, TRUE, NK	357	357	0.1	0	0.00%	0.2%	100%	853
MACKEREL, CHUB	809	337	0.1	0	0.00%	0.1%	42%	1,932

Table 45. Sharks, rays and large pelagic finfish species discarded and kept (numbers and weight, lbs) in the *Illex* fishery based on the NEFSC Observer Program database, 1995-2008 (totals).
Highlighted species are those with stocks that are overfished and/or overfishing occurring and/or the stock is subject to a rebuilding plan. Given the relatively low numbers per year that the totals below translate into, this table was not updated for the 2011 specifications but will be updated for the 2012 Specifications.

***Illex* Fishery**				
Common Name	Number Discarded	Weight (lbs) Discarded	Number Kept	Weight (lbs) Kept
CUTLASSFISH, ATL	418	245	0	0
GROUPER, NK	1	11	5	219
MACKEREL, FRIGATE	12	806	0	0
MOLA, OCEAN SUNFISH	28	6,279	0	0
RAY, NK	3	1,000	0	0
RAY, TORPEDO	11	129	0	0
RAY,MANTA, ATLANTIC	4	1,400	0	0
SHARK, ATL ANGEL	3	49	0	0
SHARK, BASKING	6	21,900	0	0
SHARK, BIGEYE SAND TIGER	1	150	0	0
SHARK, BIGNOSE	16	186	0	0
SHARK, BLACK TIP	2	24	0	0
SHARK, BLUE (BLUE DOG)	1	300	0	0
SHARK, CARCHARHIN,NK	5	118	0	0
SHARK, DUSKY	19	806	0	0
SHARK, FINETOOTH	1	19	0	0
SHARK, HAMMERHEAD, GREAT	7	2,000	0	0
SHARK, HAMMERHEAD, SCALL	35	8,045	0	0
SHARK, HAMMERHEAD,NK	7	1,035	0	0
SHARK, MAKO, NK	0	0	1	300
SHARK, NIGHT	1	23	0	0
SHARK, NK	4	293	0	0
SHARK, PORBEAGLE	1	7	0	0
SHARK, SILKY	2	91	0	0
SHARK, THRESHER	2	425	0	0
SHARK, THRESHER, BIGEYE	1	300	0	0
SHARK, TIGER	2	800	0	0
SKATE, LITTLE	1	250	0	0
STINGRAY, ROUGHTAIL	2	500	0	0
SWORDFISH	216	9,199	165	14,241
TUNA, BIG EYE	3	470	2	400
TUNA, BLUEFIN	1	57	1	100
TUNA, YELLOWFIN	6	355	8	490

7.2.2 Impacts on Habitat

Illex are taken almost exclusively by bottom otter trawls. Since Alternative 2b (status quo) is not expected to change effort, impacts would be expected to be similar to the prior fishing year. With Alternative 2a and 2c the slightly smaller DAHs have the potential to slightly reduce bottom trawling effort and therefore habitat impacts, but the fact that catch has not been recently limited by the specifications and the fact that any reduction would be very small means that with any of the alternatives impacts are likely to be similar to the prior fishing year.

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. 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.

Since Alternative 2b (status quo) is not expected to change effort, impacts would be expected to be similar to the prior fishing year. With Alternative 2a and 2c the slightly smaller DAHs have the potential to slightly reduce effort and therefore protected species impacts, but the fact that catch has not been recently limited by the specifications and the fact that any reduction would be very small means that with any of the alternatives impacts are likely to be similar to the prior fishing year.

There are no known interactions between the *Illex* fishery and any ESA listed species including sea turtles.

7.2.4 Impacts on Human Communities

Short Term (2011)

In the short term, the status quo alternative, 2b, would not be expected to change impacts on human communities compared to how the fishery was prosecuted in the previous fishing year. 2a (preferred) and 2c, with lower DAH's, could result in slightly lower effort and landings and therefore revenues if the DAH became constraining compared to what would happen under the status quo specifications. However *Illex* landings have not recently been limited by the specifications, so it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort and landings, and therefore revenues. Other than differences in how much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

Long Term

The status quo alternative, 2b, may not be sufficiently protective of the *Illex* stock given the SSC recommendation that catch (ABC) be limited to 24,000 mt because 2b makes no accounting for discards. 2a or 2c would likely keep catch (including discards) below the 24,000 mt recommended by the MAFMC's SSC and thus would be more likely to preserve the socio-economic benefits associated with a healthy *Illex* stock. Other than differences in how much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

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7.3 Impacts of Alternatives for Butterfish

7.3.1 Biological Impacts on Managed Resource and Non-Target Species

The two alternatives considered for 2011 are fully described in section 5.3 and are summarized in the Managed Resource Impact section below. Changes to measures other than specifications were not considered. Also, up to 3% of the IOY may be set aside for scientific research.

Managed Resource

The status quo specifications (3b) for butterfish would be Max OY = 12,175, ABC = 1,500, and IOY=DAH=DAP = 500 mt. The preferred alternative (3a) maintains the same specifications except removes the specification of Max OY due to the failure of the most recent assessment (SAW/SARC 49) to produce viable reference points. Thus in terms of actual operation of the fishery, the two alternatives are approximately equal and impacts are expected to be similar to the prior fishing year.

This document notes that the *Loligo* fishery will be subject to a butterfish mortality cap in 2011 (see Amendment 10 to the MSB FMP for details - http://www.mafmc.org/fmp/msb.htm), which utilizes the 2011 butterfish ABC recommended by the SSC, 1500mt. While the most recent butterfish assessment concluded that the butterfish stock status was unknown, the Council is still bound by the ABC recommended by its SSC. The new assessment did not change the conclusion that most butterfish are discarded and that most discards occur during *Loligo* fishing, so to avoid exceeding the ABC a butterfish mortality cap for the *Loligo* fishery is still needed. As described in Amendment 10, since the cap is output based it is a direct control on butterfish mortality while allowing the *Loligo* fishery the chance to catch *Loligo* while avoiding butterfish. Therefore the butterfish cap should help limit overall butterfish mortality to the SSC's recommended ABC of 1,500 mt and thus should be protective of the butterfish stock. However, given the lack of current reference points any absolute impacts are nearly impossible to predict quantitatively. The most recent assessment suggested that fishing mortality (including discards) has been minimal, further reinforcing the conclusion that impacts of the status quo specifications are likely to be similar to the prior fishing year.

The reader will note in Table 31 that from 2000-2009 between 8% and 35% of butterfish landings have come from vessels without federal permits. These landings do not appear to 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 DAH overage. Given the lack of strong butterfish market demand, the trajectory of landings in recent years, and the 20% closure buffer, this seems unlikely. In fact, there were effective closures in 2008 (only 90% of the DAH was harvested) and 2009 (only 87% of the DAH was harvested). The SMB 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 would likely recommend appropriate management measures, such as lowering the specifications for federal vessels or increasing the closure buffer, so that overall mortality goals are reached.

Predator-Prey (Forage) Considerations

Impacts are expected to be similar to the prior fishing year. Since none of the alternatives are expected to adversely impact abundance of the managed resource compared to the status quo, none are expected to negatively affect the various species and stocks of marine mammals, birds, and fish that prey on the managed resource compared to the status quo. Predator-prey interactions were also considered in the latest assessment. The Council considered that specifications could be additionally reduced beyond other factors because of predator-prey considerations but decided that such considerations were sufficiently incorporated in the SSC's ABC recommendations.

Non-Target Species

For non-target species that are managed under their own fishery management plan, incidental catch/discards are also considered as part of the management of that fishery. The list of species taken incidentally and discarded in the butterfish fishery is not calculated 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 (and double counting with other fisheries would likely occur). 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. However given the currently considered range of alternatives and their similarity to the status quo, impacts are likely to be similar to the previous fishing year.

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. However, because as described above in section 7.3.1, none of the alternatives are expected to change directed effort, impacts on habitat are likely to be similar to the previous fishing year. Additionally, since most of the butterfish caught are caught incidentally, the butterfish specifications may not be as strongly related to effort as is often the case with other species.

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. As described above in section 7.3.1, none of the alternatives are expected to change directed effort, so impacts on protected species are likely to be similar to the previous fishing year. Additionally, since most of the butterfish caught are caught

incidentally, the butterfish specifications may not be as strongly related to effort (and therefore protected resource impacts) as is often the case with other species.

7.3.4 Impacts on Human Communities

Given all proposed alternatives for butterfish maintain the status quo DAH, impacts are expected to be similar to the prior fishing year. Other than differences in how much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

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7.4 Impacts of Alternatives for *Loligo - Specifications and associated measures.*

7.4.1 Biological Impacts on Managed Resource and Non-Target Species

The three alternatives considered for 2011 are fully described in section 5.4 and are summarized parenthetically in the Managed Resource Impact section below. Changes to measures other than specifications were not considered except as noted. Also, up to 3% of the IOY may be set aside for scientific research.

Managed Resource Impacts

4a (preferred, intermediately restrictive, Max OY = 32,000, ABC=24,000, IOY=DAH= DAP=20,000mt, Trimester 1 underages over 25% will be split between Trimester 2 and 3 [just to 3 if less than 25%] but Trimester 2 can only be increased by 50% at most.). Given 2007-2009 catches were lower than the proposed 4a specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 4a would likely restrict total catch (including discards) to about 21,300 mt (6% discards), which is below the recommendation of the MAFMC's SSC so it should be generally protective of the *Loligo* stock. Since 4a's DAH is 5% greater than the status quo it would be less protective than the status quo but more protective than 4c. Limiting rollovers from Trimester 1 to Trimester 2 as proposed in 4a should not affect the *Loligo* stock and is primarily designed to address management uncertainty regarding operation of the butterfish mortality cap for the *Loligo* fishery. Allowing more than a 50% increase in the Trimester 2 quota increases management uncertainty because of the low observer coverage in Trimester 2 and because the cap does not operate during Trimester 2. If additional quota (beyond 50%) is available in Trimester 2 when the cap can not close the fishery, the mortality cap may not function as designed so as to limit overall butterfish mortality.

4b (status quo, no action, most restrictive, Max OY = 32,000, ABC=IOY=DAH= DAP=19,000mt, Trimester 1 underages over 25% will be split between Trimester 2 and 3 [just to 3 if less than 25%]). Given 2007-2009 catches were lower than the proposed 4b specifications impacts are expected to be similar to the prior fishing year. Leaving the rollover as is (compared to the modifications proposed in 4a and 4c) would also be likely to result in similar impacts for *Loligo* compared to the prior fishing year.

4c (least restrictive, Max OY = 32,000, ABC=24,000, IOY=DAH=DAP=22,560mt, Trimester 1 underages over 25% will be split between Trimester 2 and 3 [just to 3 if less than 25%] but Trimester 2 can only be increased by 50% at most.). Given 2007-2009 catches were lower than the proposed 4c specifications impacts are expected to be similar to the prior fishing year. If environmental and/or market conditions were favorable to increased catch, 4c would likely restrict catch to 24,000 mt (6% discards), which is the recommendation of the MAFMC's SSC, so 4c's specifications should be generally protective of the *Loligo* stock, though less protective than the preferred (4c) or the status quo (4b). Limiting rollovers from Trimester 1 to Trimester 2 as also proposed in 4a should not affect the *Loligo* stock and is primarily designed to address management uncertainty regarding operation of the butterfish mortality cap for the *Loligo* fishery. Allowing more than a 50% increase in the Trimester 2 quota increases management

uncertainty because of the low observer coverage in Trimester 2 and because the cap does not operate during Trimester 2. If additional quota (beyond 50%) is available in Trimester 2 when the cap can not close the fishery, the mortality cap may not function as designed so as to limit overall butterfish mortality.

While butterfish is a managed resource impacted by the *Loligo* specifications, impacts related to butterfish are described below under Non-Target Species given the incidental nature of butterfish catch in the *Loligo* fishery.

Predator-Prey (Forage) Considerations

Impacts are expected to be similar to the prior fishing year. Since none of the alternatives are expected to adversely impact abundance of the managed resource compared to the status quo, none are expected to negatively affect the various species and stocks of marine mammals, birds, and fish that prey on the managed resource compared to the status quo. Predator-prey interactions will also be considered explicitly in an upcoming assessment scheduled for the fall of 2010. The Council considered that specifications could be additionally reduced beyond other factors because of predator-prey considerations but decided that such considerations were sufficiently incorporated in the SSC's ABC recommendations.

Non-Target Species

For non-target species that are managed under their own fishery management plan, incidental catch/discards are also considered as part of the management of that fishery. The primary species taken incidentally and discarded in the directed *Loligo* fishery over the most recent five years of data (2005-2009) are listed in Table 46 and includes the species that account for 95% of all observed discards on the identified *Loligo* trips.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. Presumably some criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal. Thus to begin this process, staff first reviewed 2005-2009 trips in the dealer weighout database to see if a certain trip definition could account for most *Loligo* landed. The result of this review resulted in the following definition for *Loligo* trips using landings: All trips that had at least 50% *Loligo* by weight. This definition results in capturing almost 87% of all *Loligo* landings in the dealer weighout database. This definition was applied to the observer database to examine discards in the *Loligo* fishery. The resulting set of trips in the observer database included 71 on average for each year 2005-2009.

While a very rough estimate, especially given the low observer coverage in small mesh fisheries and non-accounting for spatial and temporal trends, one can use the information in Table 46 and the fact that about 14,030 MT of *Loligo* were caught annually 2005-2009 to generally and very roughly estimate annual incidental catch for the species in the table. This is the last column in Table 46 and while this information is provided, readers are strongly cautioned that while this is a reasonable approach for a general, rough, and relative estimate given the available data, it is highly imprecise. Note also that even the estimates that can be calculated would only really be valid for the 87% of landings captured by the chosen directed trip definition. It is even more difficult to assess the other 13% because to some degree the *Loligo* is being caught incidental to other fisheries. Nonetheless, the *Loligo*-to-other-species ratios were scaled up to the 100% of *Loligo* catch to keep things relatively simple.

2011 will also initiate the butterfish bycatch mortality cap for the *Loligo* fishery. Within the specification levels considered in this document, the cap is likely to reduce bycatch of butterfish from what it would be without the cap, and may reduce all bycatch if the cap closes the *Loligo* fishery earlier than would have otherwise occurred. All other bycatch would be approximately reduced by the percentage of the *Loligo* quota that is not harvested because of a butterfish cap closure (though seasonal/spatial variations in bycatch patterns may mean the actual reduction is more or less for a particular species). See Amendment 10 to the MSB FMP for details (http://www.mafmc.org/fmp/msb.htm). Details related to the 2011 *Loligo* specifications follow.

4a - Given 2007-2009 catches were lower than the proposed 4a specifications and lower than the then applicable DAHs (17,000 mt - 19,000 mt), impacts are expected to be similar to the prior fishing year. In other words, environmental and/or market conditions rather than the

specifications appear to be limiting *Loligo* catch, so increasing the specifications may not increase effort. If environmental and/or market conditions were favorable to increased catch, 4a could potentially allow catch of about 21,300 mt compared to the maximum potential under the status quo which could allow catch of about 20,200 mt. Thus while recent catches suggest that landings in this range may not be likely, 4a could lead to more effort compared to the status quo and therefore more non-target impacts, but the impacts are expected to be minimal given the relatively small increase and since *Loligo* landings have not achieved the DAH in recent years, it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort if any.

4a also proposes to limit the transfer of quota from Trimester 1 to Trimester 2 such that Trimester 2 could only increase by a maximum of 50%. This means that compared to the status quo, more of Trimester 1's underage could go to Trimester 3. Given the low observer coverage and given one does not know how much (if any) quota that would have been transferred from Trimester 1 to Trimester 2 could now get transferred from Trimester 1 to Trimester 3, it is infeasible to precisely and meaningfully quantify the net effects. However, analysis in the 2010 specifications suggested that overall bycatch levels would not be likely to change and that if effort shifts from Trimester 2 to Trimester 3, all else being equal, one would expect **less** bycatch of striped bass, smooth dogfish, spiny dogfish, summer flounder, winter flounder, scup, little skate, and winter skate and **more** bycatch of bluefish, butterfish, hakes, unclassified herrings, monkfish, and *Illex* (because the respective species are encountered less or more in Trimester 3 versus Trimester 2). Effects are likely to be minimal however since the proposed change actually limits the amount that can be transferred.

4b - Given this is the status-quo alternative, impacts are expected to be similar to the prior fishing year both in terms of the quota and in terms of keeping the status quo rollover provisions.

4c - Given 2007-2009 catches were lower than the proposed 4c specifications and lower than the then applicable DAHs (17,000 mt - 19,000 mt), impacts are expected to be similar to the prior fishing year. In other words, environmental and/or market conditions rather than the specifications appear to be limiting *Loligo* catch, so increasing the specifications may not increase effort. If environmental and/or market conditions were favorable to increased catch, 4c could allow catch of about 24,000 mt compared to the status quo which could allow catch of about 20,200 mt. Thus while recent catches suggest that landings in this range may not be likely, 4c could potentially lead to about 19% more effort compared to the maximum potential under the status quo and therefore more non-target impacts, however since *Loligo* landings have not achieved the DAH in recent years, it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort if any.

4c also proposes to limit the transfer of quota from Trimester 1 to Trimester 2 such that Trimester 2 could only increase by a maximum of 50%. This means that compared to the status quo, more of Trimester 1's underage could go to Trimester 3. Given the low observer coverage and given one does not know how much (if any) quota that would have been transferred from Trimester 1 to Trimester 2 could now get transferred from Trimester 1 to Trimester 3, it is infeasible to precisely and meaningfully quantify the net effects. However, analysis in the 2010 specifications suggested that overall bycatch levels would not be likely to change and that if

effort shifts from Trimester 2 to Trimester 3, all else being equal, one would expect **less** bycatch of striped bass, smooth dogfish, spiny dogfish, summer flounder, winter flounder, scup, little skate, and winter skate and **more** bycatch of bluefish, butterfish, hakes, unclassified herrings, monkfish, and *Illex* (because the respective species are encountered less or more in Trimester 3 versus Trimester 2). Effects are likely to be minimal however since the change actually limits the amount that can be transferred.

Table 46. Key species taken and discarded in directed trips for *Loligo* based on unpublished NMFS Northeast Fisheries Observer Program data and dealer weighout data from 2005-2009. (see text for criteria). There are 2204.6 pounds in one metric ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of Loligo caught, pounds of given species caught.	For every metric ton of Loligo caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Loligo Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year average of Loligo catch (14030 mt)
Directed Loligo Trip Bycatch and Discards								
DOGFISH, SPINY	349,529	348,668	149.9	149.5	0.07	0.12	1.00	2,102,803
BUTTERFISH	378,454	347,451	162.3	149.0	0.07	0.12	0.92	2,276,819
HAKE, SILVER (WHITING)	410,855	310,101	176.2	133.0	0.06	0.11	0.75	2,471,750
SQUID, SHORT-FIN	328,476	297,469	140.9	127.6	0.06	0.11	0.91	1,976,147
HAKE, RED (LING)	202,510	192,499	86.8	82.5	0.04	0.07	0.95	1,218,321
HAKE, SPOTTED	172,146	167,020	73.8	71.6	0.03	0.06	0.97	1,035,647
SQUID, ATL LONG-FIN	5,141,128	133,018	2204.6	57.0	0.03	0.05	0.03	NA
SKATE, LITTLE	126,369	126,221	54.2	54.1	0.03	0.04	1.00	760,249
MACKEREL, ATLANTIC	341,795	116,889	146.6	50.1	0.02	0.04	0.34	2,056,275
FLOUNDER, FOURSPOT	100,086	99,917	42.9	42.8	0.02	0.04	1.00	602,128
SCUP	97,151	66,398	41.7	28.5	0.01	0.02	0.68	584,469
FLOUNDER, SUMMER (FLUKE)	118,465	53,925	50.8	23.1	0.01	0.02	0.46	712,697
DOGFISH, SMOOTH	41,783	38,351	17.9	16.4	0.01	0.01	0.92	251,372
HERRING, ATLANTIC	37,530	37,500	16.1	16.1	0.01	0.01	1.00	225,782
HAKE, NK	35,605	33,913	15.3	14.5	0.01	0.01	0.95	214,206
MONKFISH (ANGLER, GOOSEFISH)	67,434	30,820	28.9	13.2	0.01	0.01	0.46	405,692
SCALLOP, SEA	39,397	30,425	16.9	13.0	0.01	0.01	0.77	237,015
BASS, STRIPED	30,822	28,985	13.2	12.4	0.01	0.01	0.94	185,430
SKATE, NK	28,790	28,695	12.3	12.3	0.01	0.01	1.00	173,203
SKATE, WINTER (BIG)	22,090	21,857	9.5	9.4	0.00	0.01	0.99	132,893
HAKE, WHITE	23,604	21,469	10.1	9.2	0.00	0.01	0.91	142,005
FLOUNDER, WINTER (BLACKBACK)	21,379	21,087	9.2	9.0	0.00	0.01	0.99	128,619
BLUEFISH	49,224	18,132	21.1	7.8	0.00	0.01	0.37	296,134
HERRING, NK	17,660	17,629	7.6	7.6	0.00	0.01	1.00	106,245
CRAB, LADY	15,645	15,645	6.7	6.7	0.00	0.01	1.00	94,120
SKATE, BARNDOOR	11,766	11,680	5.0	5.0	0.00	0.00	0.99	70,784
CRAB, JONAH	11,834	11,363	5.1	4.9	0.00	0.00	0.96	71,193
LOBSTER, AMERICAN	15,430	10,439	6.6	4.5	0.00	0.00	0.68	92,830
SEA BASS, BLACK	14,573	10,370	6.2	4.4	0.00	0.00	0.71	87,675
SEA ROBIN, STRIPED	10,767	10,294	4.6	4.4	0.00	0.00	0.96	64,775
DORY, BUCKLER (JOHN)	24,359	9,672	10.4	4.1	0.00	0.00	0.40	146,547
DOGFISH, CHAIN	8,551	8,514	3.7	3.7	0.00	0.00	1.00	51,444

Table 47. Sharks, rays and large pelagic finfish species discarded and kept (numbers and weight, lbs) in the *Loligo* fishery based on the NEFSC Observer Program database, 1995-2008.

Highlighted species are those with stocks that are overfished and/or overfishing occurring and/or the stock is subject to a rebuilding plan. Given the relatively low numbers per year that the totals below translate into, this table was not updated for the 2011 specifications but will be updated for the 2012 Specifications.

***Loligo* Fishery**				
Common Name	Number Discarded	Weight (lbs) Discarded	Number Kept	Weight (lbs) Kept
AMBERJACK, NK	1	1	1	3
BARRACUDA, NK	4	7	0	0
BONITO, ATLANTIC	3	6	5	37
COBIA	0	0	1	15
GROUPER, NK	2	17	13	335
MOLA, OCEAN SUNFISH	9	2,750	0	0
NEEDLEFISH, ATLANTIC	4	1	0	0
OILFISH	1	23	0	0
RAY, BUTTERFLY, SPINY	3	153	0	0
RAY, NK	3	134	0	0
RAY, TORPEDO	162	5,716	0	0
SHARK, ATL ANGEL	5	60	0	0
SHARK, BASKING	23	86,050	0	0
SHARK, BLUE (BLUE DOG)	3	240	0	0
SHARK, BULL	0	0	4	34
SHARK, DUSKY	11	564	1	42
SHARK, HAMMERHEAD, SCALLOPED	6	1,825	0	0
SHARK, HAMMERHEAD, SMOOTH	2	270	0	0
SHARK, HAMMERHEAD,NK	11	2,640	0	0
SHARK, MAKO, NK	1	3	1	65
SHARK, NIGHT	1	10	0	0
SHARK, NK	7	355	0	0
SHARK, PORBEAGLE	5	540	0	0
SHARK, SAND TIGER	2	79	1	50
SHARK, SANDBAR	45	1,844	0	0
SHARK, SEVENGILL SHARPNOSE	1	8	0	0
SHARK, THRESHER	3	115	1	11
SHARK, THRESHER, BIGEYE	1	80	0	0
SHARK, TIGER	3	155	0	0
STINGRAY, ATLANTIC	2	40	0	0
STINGRAY, NK	1	9	0	0
STINGRAY, PELAGIC	1	10	0	0
STINGRAY, ROUGHTAIL	11	1,765	0	0
STURGEON, ATLANTIC	13	627	0	0
SWORDFISH	43	1,396	32	1,253
TUNA, BIG EYE	1	1	0	0
TUNA, BLUEFIN	3	113	0	0
TUNA, LITTLE (FALSE ALBACORE)	17	139	5	47
TUNA, NK	1	1	0	0
TUNA, SKIPJACK	1	3	0	0
TUNA, YELLOWFIN	2	3	1	28
WRECKFISH	0	0	4	41

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. Since catch is limited by the availability of the resource, it is difficult to predict how changes in the specifications would affect effort and therefore habitat.

For 4b, the status quo, effort is likely to be approximately equivalent to last year which means 2011 fishing year habitat impacts would be expected to be similar to the previous fishing year. 4a could result in a minimal effort increase and 4c could result in somewhat more of an increase and thus additional habitat impacts. However, in recent years the DAH has not been reached so environmental and/or market conditions rather than the specifications appear to be limiting *Loligo* catch, so increasing the specifications may not increase effort. Since *Loligo* landings have not achieved the DAH in recent years, it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort if any.

Also, compared to the status quo (4b), 4a and 4c could shift some potential effort from Trimester 2 to Trimester 3 (see above), but since the overall amount of effort is unlikely to change substantially, impacts should be similar to the prior fishing year for all alternatives related to the rollover provisions.

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. For 4b, the status quo, effort is likely to be approximately equivalent to last year which means 2011 fishing year protected resource impacts would be expected to be similar to the previous fishing year (related to both the total quota and rollover provisions). 4a could result in a minimal effort increase and 4c could result in somewhat more of an increase and thus additional protected species impacts. However, in recent years the DAH has not been reached so environmental and/or market conditions rather than the specifications appear to be limiting *Loligo* catch, so increasing the specifications may not increase effort. Since *Loligo* landings have not achieved the specifications in recent years, it is difficult to predict what effect a change in the specifications might have on actual (vs. potential) fishing effort if any.

As discussed in 7.4.1, alternatives 4a and 4c could result in some effort transfer from Trimester 2 to Trimester 3 compared to the status quo, but it is impossible to quantify. Given these transfers likely most impact when the fishery closes (i.e. the end of each Trimester), one could predict that such transfers could translate to effort shifts from the months of July-Aug in Trimester 2 to the months of Nov-Dec in Trimester 3. In terms of marine mammals, such a transfer could result in some risk (albeit unquantifiable) to Common dolphins and Pilot whales since the only observed interactions with these species have occurred in the winter. However, such a transfer could result in some decreased (albeit unquantifiable) risk to sea turtles relative to the status quo since turtle interactions with the *Loligo* fishery are more likely in the warmer months. However, given the change actually means that transfers will be kept relatively small, and the relatively low

overall encounter rates compared to other fisheries, risks to marine mammals and/or turtles are still expected to be similar to the prior fishing year.

7.4.4 Impacts on Human Communities

All of the alternatives (4a, 4b, and 4c) either maintain or increase the DAH from the status quo while still staying within SSC limits designed to ensure sustainability, so impacts should be generally neutral to positive in the short and long term in terms of quota levels. Other than differences in how much of this species different ports land and the fishermen in those ports land (see Section 6.6), there are not expected to be differing impacts between particular ports and/or fishermen.

4c would result in the potential for increased revenue compared to 4a or 4b, but due to the management uncertainties inherent in implementing the new butterfish-*Loligo* cap program, the Council decided that a step-wise increase from the status quo (4b) to 4a could provide some (unquantifiable) benefits in terms of fishery stability. For example, if there is substantially more *Loligo* quota available in Trimester 1 (which 4c would result in) but the cap operates slower than expected, more of the butterfish cap could be used by Trimester 1 than intended, which would then substantially curtail Trimester 3 because of the existing rollover provisions. The stepwise increase in the quota proposed by 4a allows some additional fishing opportunity while not substantially changing the status quo while the fishery and management adjusts to the impending butterfish mortality cap. Given the low recent catches, the rollover provisions are all expected to result is similar impacts to human communities compared to the prior year.

Given the low recent catches, the rollover provisions are all expected to result is similar impacts to human communities compared to the prior year. However, some benefits in terms of fishery stability could be realized by limiting the rollover increase to 50% because additional increases in Trimester 2 when the butterfish cap is tracked but does not close the fishery could impede the expected operation of the mortality cap (Trimester 2 bycatch is essentially deducted from Trimester 3 so Trimester 3 could be impacted by high bycatch in Trimester 2, which seems more likely the higher the Trimester 2 *Loligo* quota becomes).

7.5 Impacts of Research Set-Asides (RSA) Recommendations

Per Framework Adjustment 1 to the Atlantic Mackerel, Squid and Butterfish (MSB) FMP, the annual RSA amount may vary between 0 and 3% of each species' total allowable landing level, which is the IOY value for MSB species. The Council has recommended that up to 1.65 % of the 2011 *Loligo* IOY (330mt), 3% of the *Illex* IOY, (700mt), 3% of the butterfish IOY (15mt), and 3% of the Atlantic mackerel IOY (1,403 mt) be set-aside to fund projects selected under the 2011 Mid-Atlantic RSA Program. Although the project selection and award process for the 2011 Mid-Atlantic RSA Program has not concluded, 3 projects, as described in this section have been preliminarily selected for funding. 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 2011

MSB specification rulemaking process or through the publication of a separate notice in the Federal Register notifying the public of a quota adjustment.

In order to expedite the implementation of the 2011 Mid-Atlantic RSA Program, the environmental impact of this program and the selected projects are analyzed in this document. With the exception of the research activities of Project #2, for which the NEPA and Endangered Species Act analysis occurred through a separate EA completed April 20, 2010, and a Section 7 Consultation completed April 13, 2010, this document analyzes all research activities, compensation fishing activities, and regulatory exemptions with respect to the summer flounder, scup, and black sea bass FMP. Potential environmental impacts of this program on summer flounder, scup, black sea bass, and Atlantic bluefish are addressed in those respective specification documents. Additional consultation and analysis with respect to NEPA, ESA, MSA, and other applicable law may be necessary if the statement of work changes or additional exemptions are requested.

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. Comments on EFPs issued under the 2011 Mid-Atlantic RSA program will be received through the 2011 MSB specification rulemaking process. These exemptions are necessary to facilitate compensation fishing and 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 RSA is deducted from the available IOY, exemption from closures will have no additional environmental impact. Exemption from possession limits could result in compensation fishing vessels altering their normal fishing behavior; altering tow duration or fishing longer or shorter than they otherwise would for example. However, these slight alterations in fishing behavior will not likely impact the environment beyond that of the commercial fishery otherwise operating within the full suite of regulations.

Following is a description of the three preliminarily selected projects and associated exemptions that would likely be required for to conduct the research.

Project #1: The proposed project is a scup survey of fifteen hard-bottom sites in Southern New England that are not sampled by current state and federal finfish trawl surveys. Unvented fish pots will be fished on each site from June through October. The length frequency distribution of the catch will be compared statistically to each of the other collection sites, and to finfish trawl data collected by the National Marine Fisheries Service (NMFS) for the purpose of improving scup and black sea bass stock assessments.

Scup and black sea bass will be collected from each site utilizing standard fish pots made with coated wire mesh. Pots will be unvented and therefore have the capability to retain all size classes of scup. The sampling protocol will require that the commercial vessels take 30 pots to each sampling site once during each four□week sampling cycle. Pots will be left to fish for one to two days at each site. All scup and black sea bass will be measured utilizing the standard

NMFS sea sampling protocols. At the conclusion of each sampling cycle, pots will be removed from the water. This same sampling format will be followed every four weeks from June 15 through October 15 for five complete cycles.

The survey area is separated into eastern, mid-western, and far-western sites as follows:

Eastern Sampling Sites
(1) West Chop 41 29 30 N, 70 35 W; (2) Cape Pogue 41 25 N, 70 26 W; (3) East Chop 41 23 N, 70 27 W;
(4) Horseshoe Shoals 41 30 N, 70 22 W; (5) Nortons Rock 41 26 30 N, 70 41 20 W

Mid-Western Sampling Sites
(1) Western End of Buzzards Bay (Old Cock Rock) 41 28 N, 71 01 W; (2) Browns Ledge 41 22 N, 71 04 W; (3) West or South of Nomans Island 41 26 N, 71 01 W; (4) South of Sakonnet Point, RI / Elisha Ledge 41 26 N, 71 01 W; (5) South of Newport, RI (Elbow Ledge) 41 26 N, 71 16 W

Far-Western Sampling Sites
(1) Narrow River Ledge, Mouth of Narragansett Bay 41 27 N, 71 24 W; (2) Point Judith Lighthouse 41 20 N, 71 29 W; (3) Southeast Lighthouse, Block Island 41 09 N, 71 33 W; (4) Bluff Head Ledge off Block Island 41 10 N, 71 40 W; (5) Charlestown Breachway 41 20 N, 71 40 W

Research vessels for Project #1 would require an EFP for exemption from minimum scup and black sea bass pot vent size requirements to ensure that scup length frequency data is representative and not biased. Exemption from scup and black sea bass minimum fish sizes and possession limits would also be needed for data collection purposes only. All undersized fish would be discarded as soon as practicable to minimize mortality, and fish in excess of possession limits would either be discarded as soon as practicable or landed as RSA quota.

Project #2: Because the research activities of Project #2, for which the NEPA and Endangered Species Act analysis occurred through a separate EA completed April 20, 2010, and a Section 7 Consultation completed April 13, 2010, additional environmental review under this EA is not necessary.

For informational purposes, project #2 would conduct a spring and fall monitoring (trawl) survey in shallow waters between Martha's Vineyard, MA and Cape Hatteras, NC. The project investigators plan to provide stock assessment data for Mid-Atlantic RSA species, including summer flounder, scup, black sea bass, *Loligo* squid, butterfish, and Atlantic bluefish, and assessment-quality data for weakfish, Atlantic croaker, spot, several skate and ray species, smooth dogfish, horseshoe crab, and several unmanaged but important forage species.

Project #3: The proposed project is a mark-recapture study of black sea bass at three sites off New Jersey during the spawning season (May through August) using commercial pot and recreational hook-and-line fishing. The study proposes to achieve the following objectives: Clarify the size, age, and sex selectivity of commercial pot and recreational hook-and-line gears;

monitor changes in size distribution and sex ratio over the course of a spawning season; estimate the sex ratio and rate of sex reversal by size and age; compare 3 existing methods of *in vivo* sex determination and test a new method (ultrasound); and understand fine-scale movement patterns of males and females during the spawning season.

The study will be conducted on the following three artificial reef sites off southern New Jersey: Ocean City, Wildwood, and Cape May reefs. The three reefs are fished by commercial pot fishermen and recreational anglers including party boats, charters, and private vessels. The sites are at moderate depth (17 - 27 m). Sampling of black sea bass for tagging and recapture will be conducted during 4 periods between May and September. All sampling efforts will use both standard pot and hook-and-line fishing gear to account for differences in selectivity between gears. An initial intensive 13-day tagging effort will be conducted beginning in May. Two pot retrievals and 2 days of hook-and-line fishing will be conducted at each site during the initial tagging effort. Two 7-day tagging and recapture efforts will be conducted during weeks 7 and 12 using pots (4-day initial soak time with 1 retrieval at each site) and hook-and-line gear (1 day at each of the 3 sites). A final 7-day recapture effort will be conducted during week 17. This effort will be similar to the other 7-day sampling periods, but will involve recaptures only.

During all field sampling efforts, all black sea bass captured will be measured, weighed, sexed, and examined for tags and fin clips. In addition, 4 scales will be removed from the area behind the pectoral fin for aging, approximately 1 ml of blood will be collected for subsequent analysis, and gonadal biopsy will be attempted to identify females. During the initial 13-day tagging effort and the two seven-day tagging and recapture efforts, all untagged fish will be tagged. An individually-numbered t-bar type anchor tag will be inserted below the dorsal fin using a tagging gun. During all three seven-day sampling efforts, recaptured black sea bass with tags from earlier tagging events will be measured, weighed, and sexed, and then retained for histological sex determination and assessment of reproductive condition and aging using otoliths. An array of five hydrophones (WHS_3050, Lotek Wireless Inc.) will be placed on the Ocean City reef on the first sampling date. The clustered hydrophones will monitor an area of about 0.5-0.7 km2 for the duration of the logger battery life (~ 2.5 months). Thirty individual black sea bass (15 males and 15 females) captured at this site will be surgically implanted with acoustic tags using standard procedures to reduce mortality of tagged fish and prevent tag shedding. Transmitters will be MM-11 series acoustic transmitters (67 kHz, 154 dB re 1 µPa @ 1 m, Lotek Wireless, Inc.) broadcasting at 7 sec intervals, with a battery life expectancy of 80 days. Two measures will be taken to reduce mortality associated with decompression injuries. All fish showing swelling of the abdomen and/or eversion of the stomach will have their swim bladders vented with a large diameter hypodermic needle. In addition, traps will be held for 15 minutes at 10 m depth during retrieval. A random sample of 60 tagged individuals (5 smaller and 5 larger than 30 cm from each sex and each site) will be held in seawater tanks at the Multi-species Aquaculture Demonstration Facility in Cape May, NJ for the duration of the field study to assess tagging-associated mortality.

Assuming a conservative hook-and-line catch rate of 2 fish per angler day and 20 volunteer anglers, investigators anticipate tagging approximately 40 fish per day resulting in 80 fish per site over the initial two day per site party boat sampling effort. The number of fish tagged during

pot sampling will likely be limited by tagging time rather than fish availability, since catches of more than 100 individuals are routine. Investigators anticipate a per-fish handling time of 5 min or 12 fish per-hour. Assuming 7 hours per day spent on fish processing, this equates to 84 tagged fish per day of pot sampling. With 2 retrievals per site, investigators anticipate tagging approximately 168 fish per site over the initial 13-day pot sampling effort. The total estimated tags during the initial sampling effort is therefore 744. By similar logic, investigators expect to tag approximately 372 fish during each of the two 9-day tagging and recapture efforts. The grand total then is 1,488 fish tagged, with 60 of these retained for assessment of tagging mortality.

In vivo sex determination will be accomplished using three established methods, and one new experimental approach: 1) Secondary sex characteristics, including presence of a bucal hump and bright spawning coloration, and spermiation during abdominal massage will be used to identify mature males. 2) Ovarian biopsy using a polypropelene canula will be used to identify mature females. 3) Blood concentrations of 11-ketotestosterone and 17-oestradiol will be used to identify transitional females undergoing sex reversal. 4) An experimental approach using ultrasound will be tested. This approach has been used successfully in at least 17 species of fish to date. Ultrasound has the benefit of being fast and completely non-invasive. If the technique is validated, it would be useful not only for *in vivo* sex determination, but also for market sampling where dissection is undesirable. Gonads will be processed for routine histology, and age will be determined using scales impressed in laminated plastic. Reliability of aging will be confirmed using thin transverse sections through the nucleus of otoliths.

7.5.1 Biological 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.

Research activities for project #1, as described in Section 7.5, would only occur in concert with commercial fishing trips and/or compensation fishing trips. Research activities would not result in additional fishing effort. To conduct this research, research vessels would require an EFP for exemption from minimum scup and black sea bass pot vent size requirements to ensure that scup length frequency data is representative and not biased. Exemption from scup and black sea bass minimum fish sizes and possession limits would also be needed for data collection purposes only. These changes to standard commercial fishing practice are not expected to result in a substantive increase in mortality of target and non-target fish.

Research activities for project #3, as described in Section 7.5, would only occur in concert with commercial fishing trips and/or recreational fishing trips. Research activities would not result in additional fishing effort. To conduct this research, research vessels would require exemption from commercial and recreational black sea bass quota closures to ensure the ability to sample

during such closures, and exemption from black sea bass minimum fish size and possession limits for the purpose of collecting scientific data. The additional mortality that would result from tagging activities and laboratory work would be minimal (approximately 200 black sea bass). In addition, any fish that are retained for research purposes would count against the RSA quota, further minimizing the mortality of fish that would result from this research.

7.5.2 Impacts on Habitat

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.

Although exemptions would be issued for compensation fishing that would exempt vessels from possession limits and quota closures, there would be no additional impacts on habitat because RSA quota is part of, and not in addition to, the overall summer flounder, scup, and black sea bass quotas. Because research activities for projects #1 and #3, as described in Section 7.5, would only occur in concert with commercial and recreational fishing trips and/or compensation fishing trips, it is unlikely that additional habitat impacts would result from funding these projects. Project #3 does propose to anchor 5 hydrophones on the Ocean City reef for approximately 2.5 months from the start of the study. However, it is not expected that the anchored hydrophones would cause a substantive impact on this artificial reef. The exemptions for research purposes, as described below, would not alter the impact on EFH that occurs during standard commercial and recreational fishing activities. Therefore, each of these alternatives will likely minimize the adverse effects of fishing on EFH to the extent practicable, pursuant to section 305 (a)(7) of the MSFCMA.

Research vessels for Project #1, as described in Section 7.5, would require an EFP for exemption from minimum scup and black sea bass pot vent size requirements to ensure that scup length frequency data is representative and not biased. Exemption from scup and black sea bass minimum fish sizes and possession limits would also be needed for data collection purposes only. Such exemptions would not have any additional impact on EFH.

Research vessels for Project #3, as described in Section 7.5, would require exemption from commercial and recreational black sea bass quota closures to ensure the ability to sample during such closures, and exemption from black sea bass minimum fish size and possession limits for the purpose of collecting scientific data. Such exemptions would not have any additional impact on EFH.

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 facilitate compensation fishing and 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.

Because research activities for projects #1 and #3, as described in Section 7.5, would only occur in concert with commercial and recreational fishing trips and/or compensation fishing trips, it is unlikely that research activities would have any impact on protected species. Project #3 does propose to anchor 5 hydrophones on the Ocean City reef for approximately 2.5 months from the start of the study. However, it is not expected that the anchored hydrophones would have an effect on protected species. The exemptions for research purposes, as described below, would not alter the potential effects beyond that of standard commercial and recreational fishing activities.

Research vessels for Project #1, as described in Section 7.5, would require an EFP for exemption from minimum scup and black sea bass pot vent size requirements to ensure that scup length frequency data is representative and not biased. Exemption from scup and black sea bass minimum fish sizes and possession limits would also be needed for data collection purposes only. Such exemptions would not have any effect on protected species.

Research vessels for Project #3, as described in Section 7.5, would require exemption from commercial and recreational black sea bass quota closures to ensure the ability to sample during such closures, and exemption from black sea bass minimum fish size and possession limits for the purpose of collecting scientific data. Such exemptions would not have any effect on protected species.

7.5.4 Impacts on Human Communities

Under this program, successful applicants receive a share of the annual IOY 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 DAH is taken and the fishery closes earlier than would have occurred if the RSA program was not allocated a portion of the IOY, 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 DAH relinquishes a share of the amount of quota retained by the RSA program. Given the impacts of using a minimal amount of the IOY are spread among the fishery, impacts to vessels are not expected to be substantial. Also, even these losses should be recouped in the long term because

the scientific benefits derived from RSA projects should lead to more efficient and effective 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 2011 action for *Loligo*, *Illex*, Atlantic mackerel, and butterfish are expected to be minimal since they are unlikely to cause catches to change substantially from what they were in 2010. 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 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 MSA as currently amended and of 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

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, 2011) and 2012, the year in which Amendment 11 to the MSB FMP (Mackerel Limited Access, EFH Updates, recreational-commercial mackerel allocation, at-sea mackerel processing cap) and Amendment 13 (Omnibus Annual Catch Limit and Accountability Measures) are expected to be implemented. The temporal scope of this analysis does not extend beyond 2012 because the FMP and the issues facing these fisheries may change in ways that can't be predicted or assessed at this time within the framework of an Environmental Assessment.

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. 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 overfishing definitions 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 SARC 34 (2002) 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. Some of Amendment 10's measures will have been implemented (increasing the *Loligo* minimum mesh to 2 1/8 inches) before January 1 2011.

Future actions include implementing a butterfish mortality cap under Amendment 10 in 2011, Amendment 11 which considers: a limited access program for mackerel; updated EFH designations for all species; a recreational-commercial mackerel allocation; and a cap on at-sea processing of mackerel, and Amendment 13 which will implement annual catch limits and additional accountability measures for the butterfish and mackerel fisheries.

In addition, 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. Additional 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. All MSB species are considered to be fully utilized by the US domestic fishery to the extent that availability allows full harvest of the DAH. More recent actions have focused on reducing bycatch and habitat impacts.

Cumulative Effects Analysis

The cumulative impacts of this FMP were last fully addressed in final form by the FSEIS for Amendment 10 (see Section 8.9 of Amendment 10's FSEIS at http://www.nero.noaa.gov/nero/regs/com.html) and are currently being re-addressed in the EIS for Amendment 11, which is currently under development. All four species in the management unit are managed primarily via annual specifications 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 for both the resources and communities that depend on them. Limited access and control of fishing effort through implementation of the annual specifications has had a positive impact on target and 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 also known to take significant numbers of marine mammals including common dolphin, white sided dolphin and pilot whales.

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 specifications 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. While the current status based on a 2010 TRAC assessment is unknown, the stock is likely in better shape compared to if no management had taken place. *Loligo* were considered overfished in 2000 but remedial action by the Council in subsequent years (i.e., reduced specifications) resulted in stock rebuilding to the point that the species in no longer considered overfished. *Illex* has never been designated as overfished since passage of the SFA. In the case of butterfish, the species was designated as overfished in 2005 though a 2010 assessment concluded that the current status is unknown, and that the 2005 determination probably should have been unknown as well. The 2010 assessment found that butterfish appears to be in a depleted state because of environmental conditions, and the Council is pressing forward with a 2011 implementation of a butterfish mortality cap for the *Loligo* fishery that will help limit butterfish mortality to SSC-approved levels.

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 catch these species is controlled and accounted for by the specifications and incorporated into stock assessments. In addition to mortality on these stocks due to fishing, there are other indirect effects from non-fishing anthropogenic activities, 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 substantially impacts these populations, especially in comparison to the direct effects on these populations as a result of fishing.

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. Additional actions will implemented via Amendment 13 in terms of annual catch limits and additional accountability measures to ensure sustainability moving forward.

The specifications and other measures under the preferred alternatives for 2011 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 specifications 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 controlling butterfish bycatch in the *Loligo* fishery via 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 continue to manage these resources such that the objectives of the MSA 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.

None of the management measures recommended by the Council for 2011 under the preferred alternatives is expected to substantially promote or result in increased overall 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 specifications 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 considered 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. The 2010 implementation of increased *Loligo* minimum mesh size and the 2011 implementation of the butterfish mortality cap for the *Loligo* fishery should continue to minimize bycatch to the extent practicable.

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 substantially impacts these populations, especially in comparison to the direct effects on these populations as a result of fishing.

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 others 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 2011 under the preferred alternatives are expected to promote or result in substantial changes to levels of effort relative to the status quo. As noted above, a major goal of this FMP has been the Americanization of these fisheries. Prior to the passage of the Magnuson Act and development of this FMP, the foreign prosecution of these fisheries occurred at much higher levels of fishing effort. As described in section 6.4, 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 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 mortality cap via Amendment 10 and the controlled access plan for Atlantic mackerel being developed in Amendment 11. 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 2011 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 the protected species listed in section 6.4.

Although the negative effects associated with non-fishing activities may have increased negative effects on protected species, it is likely that those actions were minor due to the limited scale of impact compared with the populations at large and their geographical range.

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. Bottom 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 MSB gear impacts on EFH, Amendment 9 prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons. All EFH designations are being updated in Amendment 11. These updated designations should improve fishery-effect mitigation and non-fishing impact consultations in the near future.

In addition to impacts on habitat due to fishing, there are other habitat effects from non-fishing anthropogenic activities in and near the Atlantic Ocean, but these are generally not quantifiable at present. Based on the MSB species EFH descriptions (see Section 6.3), only those non-fishing activities that occur in nearshore/estuarine and marine/offshore pelagic habitats have the potential to adversely impact EFH for the four species managed under the MSB FMP. Relevant high, medium, and low potential effects for these habitats from a variety of activity types are evaluated in Johnson et al. (2008). The general conclusion from Johnson et al 2008 would be that nearshore and estuarine habitats are more affected by non-fishing activities than offshore and that impacts on habitat from non-fishing habitats are many and varied. Johnson et al 2008, available at http://www.nefsc.noaa.gov/publications/tm/tm209/index.html details the expected level of habitat impact by activity type, potential impacts, and ecosystem type. Though largely unquantifiable, it is likely that non-fishing activities would have negative impacts on habitat quality from disturbance and/or construction activities in the area immediately around the affected area. Given the wide distribution of the affected species, minor overall negative effects to habitat are anticipated since the affected areas are localized to the project sites, which involve a small percentage of the fish populations and their habitat.

7.6.6 Human Communities

National Standard 8 requires that management measures take into account the fishing communities. Communities from Maine to North Carolina are involved in the harvesting of Atlantic mackerel, squid and butterfish. The Amendment 9 FSEIS and the Amendment 10 FSEIS contain descriptions 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 2011, in conjunction with the past and future actions described above, should have positive cumulative impacts for the communities which depend on these resources by maintaining stock sizes that provide for optimal sustainable harvests.

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 overall interactions of improvements in the efficiency of the fisheries are expected to generate positive impacts. These impacts will be felt most strongly in the social and economic dimension of the environment. 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. As long as management continues to prevent overfishing and rebuild overfished stocks, 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 2012 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 2011.

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 (annual or for a period of up to 3 years). Amendment 8 to the FMP established the overfishing definitions which form the basis for the 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 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 a pending Omnibus Amendment. In Amendment 11, the Council is currently considering limited access in the mackerel fishery, EFH designation updates for all species, a recreational/ commercial mackerel allocation, and at-sea mackerel processing caps. The Council is also just beginning consideration of river herring and shad bycatch issues via Amendment 14.

8.1.1 Essential Fish Habitat Assessment

The specifications under the preferred alternatives proposed in this action are not expected to result in substantial changes in effort. Therefore, the Council concluded in section 7.1-7.6 of this document that the 2011 quota specifications proposed for Atlantic mackerel, squid, and butterfish will have no adverse impacts on EFH other than those that may currently exist. Thus no mitigation of adverse effects is necessary. 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 to the extent practicable by the Lydonia and Oceanographer canyon GRAs. Therefore, the adverse habitat impacts of MSB fisheries "continue to be minimized" by the canyon GRAs. Amendment 11 is currently revising all of the MSB EFH designations and EFH impacts will continue to be monitored and addressed as appropriate.

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 CEQ's 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 for 2011 are expected to jeopardize the sustainability of any target species affected by the action (see section 7 of this document). The proposed quota specifications under the preferred alternatives for each species are consistent with the FMP overfishing definitions and best available scientific information. 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 section 7 of this document). The proposed measures maintain or reduce the specifications of IOY for the upcoming fishing year for Atlantic mackerel, *Illex*, butterfish, and provide for a small increase in the *Loligo* specifications. Therefore, none of these specifications are expected to result in substantial increases in 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 for 2011 are expected to jeopardize the sustainability of non-target species relative to the 2010 specifications. The butterfish mortality cap, which will begin in 2011, should reduce bycatch of butterfish and may reduce bycatch of other species if the cap closes the *Loligo* fishery earlier than would have otherwise occurred.

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 for 2011 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 relative to the 2010 specifications.

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, the proposed actions in these fisheries are not expected to adversely impact public health or safety.

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, green, and leatherback sea turtles as discussed in section 6.4. 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 primarily prosecuted using mid-water and bottom otter trawls. Bottom otter trawls 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 of this 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 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. As a result of these facts, the specifications in 2011 are not expected to be 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 2011 are expected to be minimal or non-existent compared to the 2010 specifications, and effects 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 overall interaction of the proposed action with other actions are expected to generate positive impacts, but 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?

There is no evidence or indication that these fisheries have ever resulted or would ever result in the introduction or spread of nonindigenous 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?

The proposed action has been proposed and evaluated consistent with prior year's specification setting processes and therefore is neither likely to establish a precedent for future actions with significant effects nor to represent a decision in principle about a future consideration.

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. Therefore the proposed action is unlikely to result in cumulative adverse effects (including any that could have a substantial effect on the target species or non target species).

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for 2011 Atlantic Mackerel, Squid and Butterfish fisheries, it is hereby determined that the proposed specifications for 2011 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

DEC 28, 2010
Date

8.3 Marine Mammal Protection Act

The various 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 the commercial quotas and other management measures in 2011 which are already in place for 2010 for Atlantic mackerel, *Illex* squid and butterfish. The *Loligo* specifications involve a small increase. None of the specifications are expected to significantly alter fishing methods or activities or result in substantially increased effort. The Council has reviewed the impacts of the proposed specifications for the 2011 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 Sections 6 and 7 of the EA.

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 2011 specifications for Atlantic mackerel, *Illex* and butterfish and the prosecution of the associated fisheries are 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 analysis 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. Additional information will be evaluated as it becomes available.

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 should be 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 or other NMFS staff with expertise on the subject matter.

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, generally through 2009 except as noted. 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 12.0 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 2011 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: Jason Didden and Richard Seagraves. Questions about this environmental assessment or additional copies may be obtained by contacting Jason Didden, Mid-Atlantic Fishery

Management Council, 800 N. State Street, Dover, DE 19901 (302-674-2331). This EA may also be accessed by visiting the NMFS Northeast Region website at http://www.nero.noaa.gov/nero/regs/com.html.

12.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA) & REGULATORY IMPACT REVIEW FOR THE 2011 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

12.1 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.

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. 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. Failure to implement the preferred measures described in this document could result in overfishing and 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., 2011) due to the impending implementation of Amendment 10 to the MSB FMP and pending (late 2010) stock assessment for *Loligo*.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

This action does not contain new collection-of-information, reporting, recordkeeping, or other compliance requirements. It does not duplicate, overlap, or conflict with any other Federal rules.

12.2 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 $36.6 million in 2009 so the measures considered in this regulatory action should not affect total revenues generated by the commercial industry to the extent that a $100 million annual economic impact will occur (especially since the proposed specifications would allow the 2009 landings to occur again). 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. Amendment 10 is the most recent Amendment for which an FSEIS is available. The economic analysis presented with Amendment 10 was largely qualitative in nature but used quantitative measures whenever possible to describe the MSB fisheries and the impacts of the alternatives being considered.

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.

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 mentioned 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).

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.

[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.

Alternatives

Table 1 is reproduced below to provide a review of the range of alternatives considered in the proposed action.

Table 1. Qualitative summary of expected impacts of specifications considered for 2011 compared to status quo. ("+" signifies a positive impact, "-" a negative impact, and "0" a null impact. "0/" before "+" or "-" indicates a likely small impact; "#a" Alternatives are preferred (unshaded and bolded)

	Valued Ecosystem Components/Environmental Dimensions				
Alternatives - JVP and TALFF are not listed in the table because they are both zero throughout. DAHs may be reduced to provide RSA quota as described in this document.	Managed Resource	Non-target Species	Human Communi-ties	Protected Resources	Essential Fish Habitat
Alternative 1a - Mackerel (preferred, intermediately restrictive); ABC=47,395mt; IOY=DAH= 46,779mt, DAP=31,779mt; REC = 15,000mt	**0/+**	**0/+**	**0/+**	**0/+**	**0/+**
Alternative 1b - Mackerel (status quo, no action, least restrictive); ABC=156,000mt; IOY=DAH= 115,000mt; DAP=100,000mt; REC = 15,000mt	0	0	0	0	0
Alternative 1c - Mackerel (most restrictive); ABC=38,444mt; IOY=DAH= 37,944mt; DAP=22,944 mt; REC = 15,000mt	0/+	0/+	0/+	0/+	0/+
Alternative 2a - *Illex* (preferred, intermediately restrictive); ABC=24,000; IOY=DAH= DAP=23,328mt.	**0/+**	**0/+**	**0/+**	**0/+**	**0/+**
Alternative 2b - *Illex* (status quo, no action, least restrictive); Max OY= ABC=IOY=DAH=DAP = 24,000mt.	0	0	0	0	0
Alternative 2c - *Illex* (most restrictive); ABC=24,000; IOY=DAH= DAP=22,656 mt.	0/+	0/+	0/+	0/+	0/+
Alternative 3a - butterfish (preferred); ABC=1,500mt; IOY=DAH= DAP=500mt	**0**	**0**	**0**	**0**	**0**
Alternative 3b - butterfish (status quo and no action, same as preferred except maintains Max OY); Max OY = 12,175; ABC=1,500mt; IOY=DAH=DAP=500mt	0	0	0	0	0
Alternative 4a - *Loligo* (preferred, intermediately restrictive); Max OY = 32,000; ABC=24,000; IOY=DAH=DAP=20,000mt. Trimester 1 underages over 25% will be split between Trimester 2 and 3 (just to 3 if less than 25%) but Trimester 2 can only be increased by 50% at most.	**0**	**0/-**	**0/+**	**0/-**	**0/-**
Alternative 4b - *Loligo* (status quo, no action, most restrictive); Max OY = 32,000; ABC=IOY=DAH=DAP=19,000mt. Trimester 1 underages over 25% will be split between Trimester 2 and 3 (just to 3 if less than 25%)	0	0	0	0	0
Alternative 4c - *Loligo* (least restrictive); Max OY = 32,000; ABC=24,000; IOY=DAH=DAP=22,560mt. Trimester 1 underages over 25% will be split between Trimester 2 and 3 (just to 3 if less than 25%) but Trimester 2 can only be increased by 50% at most.	0	0/-	0/+	0/-	0/-

Atlantic mackerel

The three alternatives considered for Atlantic mackerel specifications for 2011 are fully described in section 5.1 and are summarized in Table 1 above. Changes to measures other than ABCs were not considered. Up to 3% of the IOY may be set aside for scientific research.

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 preferred specifications for 2011 represent a reduction from the status quo but are still above recent (2007-2009) landings, so no change in landings would be expected as a result of the specifications in 2011 compared to how the fishery operated in 2010.

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 2011 proposed specifications. Since the majority of US caught Atlantic mackerel are exported to foreign markets, prices will depend principally on the state of world demand for mackerel and the world supply of mackerel in 2011. Since US supply of mackerel is small compared to world supply and demand, it appears unlikely that potential changes in US production will result in a change in price on the world market (and hence the amount received by US producers in the world export market).

Consumer Surplus

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

Harvest Costs

No changes to harvest costs relative to the status quo for the MSB fisheries are expected as a result of the considered measures; only the IOY varies between the considered measures.

Producer surplus

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

Properly defined, enforcement costs are not equivalent to the budgetary expense of dockside or

at-sea inspection of vessels. Rather, enforcement costs from an economic perspective, are measured by opportunity cost in terms of foregone opportunities related to enforcing regulations. None of the measures are expected to increase enforcement costs.

Distributive Effects

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

Alternatives for *Illex*

The three alternatives considered for *Illex* specifications for 2011 are fully described in section 5.2 and are summarized in Table 1 above. Changes to measures other than ABCs were not considered. Up to 3% of the IOY may be set aside for scientific research.

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 preferred specifications for 2011 represent a slight reduction from the status quo but are still above recent (2007-2009) landings, so no change in landings would be expected as a result of the specifications in 2011 compared to how the fishery operated in 2010.

Prices

Given the likelihood that the alternatives considered for *Illex* would not affect landings in 2011, 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 should 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 should be no corresponding change in producer surplus associated with alternatives considered for *Illex*.

Enforcement Costs

The alternatives considered are not expected to change enforcement costs.

Distributive Effects

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

Alternatives for butterfish

The three alternatives considered for butterfish specifications for 2011 are fully described in section 5.3 and are summarized in Table 1 above. Changes to measures other than ABCs were not considered. Up to 3% of the IOY may be set aside for scientific research.

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 preferred specifications for 2011 represent the status quo so no change in landings would be expected as a result of the specifications in 2011 compared to how the fishery operated in 2010.

Prices

Given the likelihood that the alternatives considered will result in no significant change in butterfish landings in 2011, 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 as a result of the alternatives considered.

Consumer Surplus

Assuming butterfish prices will not be affected under the alternatives considered there should 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.

Producer surplus

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

Enforcement Costs

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 three alternatives considered for *Loligo* specifications for 2011 are fully described in section 5.4 and are summarized in Table 1 above. Changes to measures other than ABCs were not considered. Up to 1.65% of the IOY may be set aside for scientific research.

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 preferred specifications for 2011 represent a slight increase from the status quo but since the fishery was not reaching the status quo specifications there may be no increase in landings despite the increase in specifications.

Prices

Given the overall likelihood that the alternatives considered for *Loligo* would not significantly affect landings in 2011, it is assumed that there will not be a change in the price for this species as a result of the alternatives considered.

Consumer Surplus

Assuming *Loligo* prices will not be affected under the alternatives considered there should 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.

Producer surplus

Assuming prices will not be affected under the alternatives considered there should be no corresponding change in producer surplus as a result of the alternatives considered.

Enforcement Costs

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

Distributive Effects

The alternatives consider shifting somewhat less of any potential Trimester 1 underage to Trimester 2 than could happen under the status quo, but the effects are likely minimal and difficult to quantify since one never knows how much quota will be caught in Trimester 1 in any given year.

Summary of Impacts

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, which appear to be minimal.

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 2011 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 7 of this EA has a description of the cumulative impacts of the measures established under the FMP since it was implemented.

12.3 INITIAL REGULATORY FLEXIBILITY ANALYSIS

12.3.1 INTRODUCTION AND METHODS INCLUDING NUMBER OF REGULATED ENTITIES

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 sector as a firm with receipts (gross revenues) of up to $4.0 million. Party/charter small businesses are included in NAICS code 487210 and are defined as a firm with gross receipts of up to $7 million.

The measures regarding the 2011 quotas could affect any vessel holding an active Federal permit for Atlantic mackerel, *Loligo, Illex* or butterfish, as well as vessels that fish for any one of these species in state waters. According to NMFS permit file data, 2,319 commercial vessels possessed Atlantic mackerel permits, 365 vessels possessed *Loligo*/butterfish moratorium permits, 76 vessels possessed *Illex* permits, 2124 vessels possessed incidental catch permits in 2009, and 850 vessels possessed squid/mackerel/butterfish party/charter permits. In 2009 all but 3 of the relevant commercial vessels were within the definition of a small business. While gross revenue data is not available for the party/charter sector, it is a reasonably safe presumption that almost all if not all of the party/charter vessels would qualify as a small business. Many vessels participate in more than one of these fisheries; therefore, permit numbers are not additive. The distribution of permitted and active vessels by state may be found in Section 6.

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 active vessel tables in Section 6 above). 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 2009. NMFS weighout databases cover 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.

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. 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.

12.3.2 ANALYSIS OF THE IMPACTS OF ALTERNATIVES

For the purpose of ease of comparison, the specifications in recent years compared to actual fishery performance are given by species in Tables 48-51 below.

Table 48. IRFA-1. Summary of specifications and landings for Mackerel (mt).

	2005	2006	2007	2008	2009	2010
ABC[1]	335,000	335,000	186,000	156,000	156,000	156,000
IOY	115,000	115,000	115,000	115,000	115,000	115,000
DAH[2]	115,000	115,000	115,000	115,000	115,000	115,000
DAP	100,000	100,000	100,000	100,000	100,000	100,000
JVP	0	0	0	0	0	0
TALFF	0	0	0	0	0	0
US Commercial	42,187	56,860	25,547	21,748	22,634	-
US Value (m $)	11.0	23.7	6.6	6.2	8.0	-
US Recreational	1,033	1,633	884	691	747	-
Total US	43,220	58,493	26,431	22,439	23,381	-
Canadian	53,565	54,279	53,649	50,578	28,288	-

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

Table 49. IRFA-2. Summary of specifications and landings for *Illex* (mt).

	2005	2006	2007	2008	2009	2010
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)	12,011	13,944	9,022	15,900	18,418	-
Value (millions $)	8.4	7.9	3.9	8.3	9.7	-

Table 50. IRFA-3. Summary of specifications and landings for butterfish (mt).

	2005	2006	2007	2008	2009	2010
Max OY	12,175	12,175	12,175	12,175	12,175	12,175
ABC	4,525	4,545	4,545	4,545	1,500	1,500
IOY	1,681	1,681	1,681	1,681	500	500
DAH	1,681	1,681	1,681	1,681	500	500
DAP	1,681	1,681	1,681	1,681	500	500
JVP	0	0	0	0	0	0
TALFF[2]	0	0	0	0	0	0
Landings (mt)	437	554	674	451	435	-
Value (millions $)	0.7	0.8	1.1	0.8	0.6	-

Table 51. IRFA-4. Summary of specifications and landings for *Loligo* (mt).

	2005	2006	2007	2008	2009	2010
Max OY	26,000	26,000	26,000	26,000	26,000	26,000
ABC	17,000	17,000	17,000	17,000	19,000	19,000
IOY	17,000	17,000	17,000	17,000	19,000	19,000
DAH	17,000	17,000	17,000	17,000	19,000	19,000
DAP	17,000	17,000	17,000	17,000	19,000	19,000
JVP	0	0	0	0	0	0
TALFF	0	0	0	0	0	0
Landings (mt)	16,974	15,907	12,342	11,409	9.306	-
Value (millions $)	28.9	27.8	23.2	23.3	18.3	-

12.3.2.1 Impacts of Alternatives for Atlantic mackerel

The alternatives considered for this species are fully described in section 5.1 of the EA and are summarized in Table 1 above. All alternatives exceed recent landings of mackerel (2007-2009) and would therefore likely be unconstraining for 2011 (there were no closures related to achieving the DAH in those years). In the absence of any expected constraints on vessels in the fishery in aggregate or individually, there is no expected impact on revenues under the Regulatory Flexibility Act and the proposed 2011 specifications could actually allow for an increase in ex-vessel revenues in 2011 compared to 2007-2009.

12.3.2.2 Impacts of Alternatives for *Illex*

The alternatives considered for this species are fully described in section 5.1 of the EA and are summarized in Table 1 above. All alternatives exceed recent landings of *Illex* (2007-2009) and would therefore likely be unconstraining for 2011 (there were no closures related to achieving the DAH in those years). In the absence of any expected constraints on vessels in the fishery in aggregate or individually, there is no expected impact on revenues under the Regulatory Flexibility Act and the proposed 2011 specifications could actually allow for an increase in ex-vessel revenues in 2011 compared to 2007-2009.

12.3.2.3 Impacts of Alternatives for butterfish

The alternatives considered for this species are fully described in section 5.1 of the EA and are summarized in Table 1 above. They essentially maintain the status quo DAH of 500 mt, which controls landings. 500 mt constrains the butterfish fishery, however this is the same as last year so there would be no change compared to how the fishery operated last year. 500 mt exceeds landings in 2008 and 2009 but is less than landings for 2007, which had 674 mt in landings. However, since the proposed specifications are not likely to cause a change in revenues from the status quo, the impact is considered minimal and analysis concluded at this point - the 2011 specifications are not expected to have substantial negative impacts on businesses involved in the commercial harvest of this species compared to how the fishery operated in 2010. To the extent that the butterfish specifications inform the butterfish cap on the *Loligo* fishery, the butterfish specifications could impact the *Loligo* fleet but these impacts are discussed below in 12.3.2.4 and in greater detail in Amendment 10 to the MSB FMP.

12.3.2.4 Impacts of Alternatives for *Loligo*

The alternatives considered for this species are fully described in section 5.1 of the EA and are summarized in Table 1 above. All alternatives exceed recent landings of *Loligo* (2007-2009) and would therefore likely be unconstraining for 2011 (there were no closures related to achieving the DAH in those years). In the absence of any expected constraints on vessels in the fishery in aggregate or individually, there is no expected impact on revenues under the Regulatory Flexibility Act and the proposed 2011 specifications could actually allow for an increase in ex-vessel revenues in 2011 compared to 2007-2009.

While the preferred *Loligo* specifications could allow for an increase in landing/revenue, the new butterfish mortality cap could close the *Loligo* fishery before the *Loligo* specifications close the *Loligo* fishery. In 2009 the *Loligo* fishery ex-vessel value was approximately 18 million dollars. While it is not possible to estimate when the *Loligo* fishery might reach the cap because environmental conditions and fleet behavior are likely to strongly influence how much butterfish the *Loligo* fishery encounters, if high rates of butterfish catch occur Amendment 10 found that potentially 64% of 2006 *Loligo* revenue levels could be lost if bycatch rates are high. While 2007-2009 landings have been lower, so a closure would likely cause a smaller impact, the fact still remains that a closure related to the butterfish mortality cap could substantially restrict *Loligo* landings. The economic impacts of the cap are further detailed in Amendment 10.

13.0 APPENDIX A - SSC ABC RECOMMENDATIONS

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

Richard B. Robins, Jr.
Chairman

Lee G. Anderson
Vice-Chairman

800 North State Street, Suite 201
Dover, Delaware 19901
Tel 302-674-2331
Toll Free 877-446-2362
Fax 302-674-5399
www.mafmc.org

Daniel T. Furlong
Executive Director

MEMORANDUM

DATE: May 26, 2010

TO: Richard B. Robins, Jr., Chairman, Mid-Atlantic Fishery Management Council

FROM: John Boreman, Ph.D., Chairman, MAFMC Scientific and Statistical Committee

Subject: Report of May 2010 Meeting of the MAFMC Scientific and Statistical Committee

The Scientific and Statistical Committee (SSC) of the Mid-Atlantic Fishery Management Council (MAFMC) met on 11-12 May 2010 to review stock assessment information and develop acceptable biological catch (ABC) recommendations for six species under the management purview of the MAFMC: surfclam, ocean quahog, *Loligo* squid, *Illex* squid, butterfish, and Atlantic mackerel. A total of 13 of the 18 SSC members were in attendance on May 11th and 14 members in attendance on the 12th, which represented a quorum for both days as defined by the SSC standard operating procedures. Also in attendance were representatives of the MAFMC, MAFMC staff, Northeast Fisheries Science Center scientists (NEFSC), and the public (see attached attendance list).

For each species, MAFMC staff described the assessment history, the most recent survey and landings information, and the basis for the most recent quota set by the MAFMC. Scientists from the NEFSC were then asked to comment, followed by the species lead for the SSC. The public was then invited to comment, but only on scientific uncertainty issues for the species. Following comments from the MAFMC staff, NEFSC scientists, the SSC species lead, and the general public in attendance, the SSC species lead led the SSC discussion on selection of an ABC for the 2011 (and beyond) fishing year. Once the discussion was completed, the SSC provided consensus statements in response to the terms of reference provided by the MAFMC. The terms of reference were the same for each of the six species. The SSC also determined which of the four tiers best described the status of assessment information for each species, based on the ABC control rule in the proposed omnibus amendment currently out for public comment.

The following represents the consensus responses by the SSC to the ABC terms of reference for each of the six species covered in the 11-12 May 2010 meeting.

Surfclams

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013. Mid-Atlantic Fishery Management Council. 38 p.

- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Summary Report. Ref. Doc. 10-01; 41 p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Report. Ref. Doc. 10-03; 383 p.
- SARC 49 panelist reports
- Updates on survey indices and landings data

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

The F_{MSY} proxy = 0.15 (F=M=0.15). Projected catches at F = F_{MSY} are:

2010	129,300 mt
2011	114,000 mt
2012	102,300 mt
2013	93,400 mt

Catches in 2010 are not expected to be at F_{MSY} levels, however. Thus, available biomass to support catches in 2011-2013 would be expected to be somewhat greater, so these projections may be underestimates.

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

Catches at F_{MSY} proxy have a high probability of leading to stock declines below the B_{MSY} proxy target level in 2015, and are projected to lead to high probabilities of overfishing in 2015. Thus, the ABC should be significantly lower than the OFL. The SSC recommends an ABC equal to the catch at $0.75*F_{OFL}$*Biomass, based on Restrepo et al. (1998: http://www.nmfs.noaa.gov/sfa/NSGtkgd.pdf):

= 0.75*0.15*878,000 mt
= 0.11*878,000 mt
= **96,600 mt** (includes incidental mortality)

The range of optimum yields (OY) specified in the Fishery Management Plan is between 14,300 and 26,200 mt. The upper value has been used as a quota from 2005-2010.

The stock is currently not overfished, and overfishing is not occurring. However, Delmarva and New Jersey components are well below 50% of the 1999 biomass in the respective regions (= B_{MSY} proxy).

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

See Table A1 from the assessment summary document:

Table A1. Decision table showing probabilities of a simulated surfclam stock with total biomass (120+ mm) at or lower than the target level (B_{Target}=B_{1999}/2), at or lower than the threshold level ($B_{Threshold}$=B_{Target}/2), and with fishing mortality rates at or higher than the threshold level ($F_{Threshold}$=M) during 2015. The analysis examines nine states of nature and four possible management approaches. Probabilities for states of nature are described as Low, Medium or High. The column "Pattern ID for dredge efficiency" is to help readers make comparisons among rows.

States of nature			Management actions				
Natural mortality	Survey dredge efficiency	Probability for state of nature	FMP minimum	Industry estimate	FMP maximum	F_{MSY} proxy	Pattern ID for dredge efficiency
Probability of stock biomass below B_{MSY} proxy target level in 2015							
Low	Low	Low	0	0	0	0.612	
Low	Medium	Medium	0	0	0	0.982	
Low	High	Low	0	0	0.004	1	
Medium	Low	Medium	0	0	0	0.91	
Medium	Medium	High	0	0	0.002	0.952	
Medium	High	Medium	0.006	0.012	0.014	0.998	
High	Low	Low	0	0	0	0.618	
High	Medium	Medium	0	0.002	0.002	0.924	
High	High	Low	0	0.002	0.018	0.984	
Probability of stock biomass below $B_{Threshold}$ level in 2015							
Low	Low	Low	0	0	0	0	
Low	Medium	Medium	0	0	0	0	
Low	High	Low	0	0	0	0.894	
Medium	Low	Medium	0	0	0	0	
Medium	Medium	High	0	0	0	0.002	
Medium	High	Medium	0	0	0	0.268	
High	Low	Low	0	0	0	0	
High	Medium	Medium	0	0	0	0	
High	High	Low	0	0	0	0.294	
Probability of overfishing in 2015							
Low	Low	Low	0	0	0	0.908	
Low	Medium	Medium	0	0	0	1	
Low	High	Low	0	0	0	1	
Medium	Low	Medium	0	0	0	0.312	
Medium	Medium	High	0	0	0	0.948	
Medium	High	Medium	0	0	0	1	
High	Low	Low	0	0	0	0.002	
High	Medium	Medium	0	0	0	0.196	
High	High	Low	0	0	0	0.996	

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Heterogeneity of life history and production parameters over the range of the stock means that model results may be accurate on average, but inaccurate in any particular region (e.g., regional differences in surplus production). This is exacerbated by uncertainty in the distribution of future fishing effort on GB (currently closed to fishing for surfclams) and fact that effort is currently not distributed uniformly.
- The use of F=M as an FMSY proxy is not supported by recent apparent negative surplus production: growth and recruitment are insufficient to compensate for natural and fishing mortalities. There is no sustainable yield. Even in the absence of fishing mortality, the stock will not increase, especially in southern areas.
- Uncertainty in using F_{msy} proxy = M (no uncertainty characterization in OFL);
- Uncertainty in M (there are no direct estimates of natural mortality);
- If surfclams in the George's Bank region are near carrying capacity, then their surplus production could be low;
- Survey dredge efficiency is highly variable;
- Georges Bank role with respect to recruitment contribution is unclear. It is unavailable to exploitation; and
- Projections assumed 1999 biomass = virgin biomass.

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Level 3: OFL exists, but no probability distribution of OFL is available. (Approximation of F_{msy} by M has no probability distribution.)

Ocean Quahog

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013. Mid-Atlantic Fishery Management Council. 38p.
- Northeast Fisheries Science Center. 2010. 48th Northeast Regional Stock Assessment Workshop (48th SAW) Assessment Summary Report. Ref. Doc. 09-10; 58 p.
- Northeast Fisheries Science Center. 2010. 48th Northeast Regional Stock Assessment Workshop (48th SAW) Assessment Report. Ref Doc. 09-15 834 p.
- SARC 48 panelist reports
- Updates on survey indices and landings data

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

The OFL is based on B_{2008} (exploited area only), and F_{msy} proxy = $F_{45\%}$ = 0.0219; 2011-2013 OFL = 34,800 mt

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

The SSC recommends and ABC for 2011-2013 = 75% F_{msy} proxy*B_{2008} (exploited area); ABC = **26,100 mt**.

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

Not possible, given available information.

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Data Uncertainties: The abundance surveys and dredge efficiency estimates are sources of uncertainty. Survey abundance estimates have a quite low coefficient of variation (10 to 21% in 12 survey years), suggesting they are reliable. Data on recruitment is uncertain; there apparently have been some regional recruitment events but these are not well defined. Natural mortality must be low, but there are no estimates. Underlying age structure and growth rate are unknown.
- Model Uncertainties: Lacking estimates, proxies for B_{msy} and F_{msy}, and associated F reference levels, are adopted. Sensitivity analysis and probabilities of B and F levels are derived from stochastic runs of KLAMZ for assumed M levels. Accurate knowledge of M would reduce uncertainty in the assessment and projections. KLAMZ does not provide explicit threshold or target reference points for ocean quahog.

- Stock Status and Reference Points: Trends in stock are well documented, by region and for the total stock. New reference points recommended by SARC 48 are more conservative than previous reference points. Uncertainties in fishing mortality estimates, based on catch data and swept area biomass estimates, were evaluated by region. Confidence intervals on the estimated (modeled) stock biomass are quite high and thus a source of uncertainty. Overall, the stock seems to be in good shape at present, although the long-term prognosis for this unproductive stock is uncertain.
- A source of uncertainty is the Georges Bank component of stock that is not now fished, but might be fished in the future. How should it be included in assessments and in evaluation of uncertainty? Fully 45% of the ocean quahog stock is on Georges Bank.
- Forecasting: Projections of stock status under different fishing mortality rates and assumed natural mortality rates were conducted to year 2015. Projections in that 5-yr timeframe do not suggest biomass will decline rapidly at present F level. But, if fishing mortality increases to the new proposed $F_{threshold}$ level, the projections indicate that overfishing is highly probable at $F_{45\%}$ by 2015. At $F_{present}$ the risk of overfishing is low.
- The long-term sustainability of a low-productivity stock like ocean quahog is a source of uncertainty. It is not known if MSY concepts and theory apply to ocean quahog, and whether sustainable fishing is possible under usual circumstances and assumptions. The SSC offers precautionary advice that even (very) low F levels probably not sustainable in the long term, given its life history and associated population dynamics (i.e., slow growing, very long-lived, recruitment possibly sporadic). The next SARC should reconsider BRPs (F_{msy} proxy = $F_{45\%}$ may not be appropriate)

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Level 3: OFL exists, but no probability distribution (approximation of F_{msy} by F45% has no probability distribution).

Loligo Squid

1) The materials considered in reaching its recommendation;

- Assessment documents from SARC 34 (containing data through 2000); a benchmark assessment is scheduled for Fall 2010
- Updates of landings and survey index data

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

32,000 mt. The revised F threshold value is F = 1.24, which equates to an OFL of 32,000 mt when applied to the 2003-2007 average fall survey biomass estimate. The revised F threshold value was derived from SARC 34's advice and was the 75th percentile of achieved Fs over the period 1987-2001, a period when the *Loligo* stock appeared to be relatively resilient.

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

The SSC recommends **24,000 mt**, which represents 75% of the catch associated with $F_{threshold}$, and is also close to catch derived from the SARC 34 recommended methodology (24,700 mt).

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

Not possible, given available information.

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Surveys cover unknown portion of entire range (variable availability). Range may extend beyond survey coverage, but less likely an issue for *Loligo* than *Illex*.
- Poor precision of U.S. discard estimates;
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the true signal;
- Erratic survey trends;
- High, and highly variable, natural mortality;
- Extremely short life-span (less than 1 year), and unknown but likely high impact of environmental factors on recruitment; and
- No biomass reference points as per SARC 34 advice (only fishing mortality).

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Tier 3: No probability distribution for the OFL is available.

Illex Squid

1) The materials considered in reaching its recommendation;

- Assessment Documents (SARC 21, SARC 37, and SARC 42 (no new benchmark assessment are currently scheduled)
- Updates of landings and survey index data

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

The SSC determined it was not possible to provide an OFL given currently available scientific information.

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

24,000 mt. The 24,000 mt for Illex is not an assessment-based ABC. Even though trawl survey CPUE and landings have varied, there do not appear to be any long-term trends; changes in landings could be the result of changes in abundance, availability, and/or market conditions. Additionally, there is no available evidence that landings of 24,000-26,000 MT have caused harm to the *Illex* stock.

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

Not possible, given available information.

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Surveys cover an unknown portion of entire range (variable availability);
- Poor precision of U.S. discard estimates (but of low magnitude);
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the true signal;
- LPUE values are sensitive to availability;
- High, and highly variable natural mortality;
- Extremely short life-span (less than 1 year), and unknown but likely high impact of environmental factors on recruitment; and
- No available estimates of biological reference points (F & B), and no estimates of recent biomass and/or fishing mortality.

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Tier 4: No available estimates of biological reference points (F & B), and no estimates of recent biomass and/or fishing mortality.

Butterfish

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. 2011 Atlantic mackerel, *Loligo*, and *Illex* Squid and Butterfish Staff ABC White Paper. Mid-Atlantic Fishery Management Council. 31p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Summary Report. Ref. Doc. 10-01; 41 p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Report. Ref. Doc. 10-03; 383 p.
- Updates on survey indices and landings (2009)
- SARC 49 panelist reports

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

An estimate of OFL was not available from the most recent stock assessment (49th SAW).

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

The SSC recommends a *status quo* ABC, **1500 mt**. Assessment reports that abundance trends are in decline and at historically low levels. However F appears very low. SSC concluded that maintaining ABC levels at this time is warranted. Available information suggests stock improvement at 1500 MT ABC, if environmental conditions improve.

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC

recommendations (if not possible, provide a qualitative evaluation);

Not possible, given the available information, but likely low.

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Discards imprecisely estimated;
- Survey indices, except for the NEFSC fall survey;
- Model-based estimates of biomass and F are generally imprecise;
- No accepted reference points; and
- Probable large role of environmental drivers (including predation).

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Tier 4: No estimates of the biological reference points are available.

Atlantic Mackerel

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. 2011 Atlantic mackerel, *Loligo*, and *Illex* Squid and Butterfish Staff ABC White Paper. Mid-Atlantic Fishery Management Council. 31p.
- 2010 TRAC Summary and working papers
- Updates on survey indices and landings (2009)
- Letter from Sustainable Fisheries Coalition, dated 9 May 2010 (attached)

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

An estimate of OFL was not available from the most recent stock assessment (2010 TRAC).

3) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the intent of the Act and the National Standard 1 Guidelines;

The SSC accepted the TRAC recommendation of **80,000 mt**. The SSC decided that the 2009 landings and survey index, in and of themselves, were not sufficient information to deviate from the TRAC recommendation.

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

Not possible, given the available information.

5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

- Lack of quantification of the linkage between US and Canadian catches;

- Surveys cover an unknown portion of entire range (variable availability);
- No Canadian discard information and poor precision of U.S. discard and recreational estimates (though likely low);
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the signal;
- Conflicting catch-at-age and survey information;
- No satisfactory explanation of model retrospectives;
- Apparent, but not fully explainable changes in survey catchability, which may alias a number of unidentified factors.

6) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Tier specification

Tier 4: No estimates of biological reference points are available.

Attachments

cc:
Members, MAFMC SSC
R. Seagraves
T. Hoff
J. Didden

ATTENDANCE

May 11, 2010

Rich Seagraves	MAFMC Staff
Tom Hoff	MAFMC Staff
Jose Montanez	MAFMC Staff
Mark Holliday	SSC Member - NOAA Fisheries
Lee Anderson	MAFMC Vice Chair
Rick Robins	MAFMC Chair
Chris Moore	SSC Member - NOAA Fisheries
John Boreman	SSC Member - NCSU
Mike Frisk	SSC Member - Stony Brook
Robert Latour	SSC Member - VIMS
Scott Crosson	SSC Member - NC DMF
Cynthia Jones	SSC Member - Old Dominion Univ
Brian Rothschild	SSC Member - U MASS
Bonnie McCay	SSC Member - Rutgers
Dave Secor	SSC Member - UMCES
Edward Houde	SSC Member - UMCES
Doug Lipton	SSC Member - UMCP
Wendy Gabriel	SSC Member – NEFSC
Fred Serchuk	SSC Liaison – NMFS/NEFSC
Joe Garvilla	BJ Clam
Pam Gromen	NCMC
Michael LaVecchia	LaMonica Fine Foods
Joe Lacotte	Snow's/Bumble Bee Foods
Carolyn Creed	Rutgers
Sam Martin	Atlantic Cape Fisheries
Jeff Kaelin	Lund's Fisheries, Inc
Daniel Hennen	NEFSC
Toni Chute	NEFSC
Dave Wallace	Wallace & Associates
Pete Jensen	Wallace & Associates
Tom Alspach	Sea Watch International
Eric Powell	Rutgers

May 12, 2010

All SSC Members from May 11.

Mike Wilberg	SSC Member – UMCES
Fred Serchuk	SSC Liaison – NMFS/NEFSC
John Klinck	Old Dominion Univ
Dave Ellenton	Cape Seafoods, Inc & Western Sea Fishing Co.
Greg DiDomencio	GSSA
Pam Gromen	NCMC
Jose Montanez	MAFMC Staff
Rich Seagraves	MAFMC Staff

14.0 APPENDIX B - CANADIAN CATCH DETAILS & U.S ABC (MACKEREL)

To get the U.S. ABC, Canadian catch must be accounted for and per the FMP is deducted "off the top" from the total ABC. Since the MAFMC SSC recommended an 80,000 mt overall ABC, the U.S. ABC = 80,000 mt - (expected Canadian catch). The procedures considered to determine "expected Canadian catch" for each mackerel alternative in the document are described below:

1a (preferred) - Staff analysis of data from 1994 to 2010 (1994 was used as a start point given most vessels began mandatory reporting then because of other Northeast permit requirements) revealed that Canadian commercial landings in one year are highly correlated to U.S. commercial landings in the previous year (0.86). The same analysis revealed that on average, Canadian landings in one year were 1.71 times as high as U.S. landings in the previous year, with the range being .93 (Canadian landings were lower) to 4.24 (Canadian landings were 4.24 times higher). These may be thought of as scaling factors. The 95th percentile of the scaling factors is 3.2181. Over the time series, if you take U.S. landings in one year and multiply by 3.2181, subsequent Canadian landings are generally overestimated, and underestimated only in 1 of the 15 year-pairs examined. While 2010 has not been completed, historically there are very low U.S. landings relative to total annual landings after July 1. The dealer weighout data thus suggest that U.S. 2010 landings are unlikely to exceed 10,000 mt (See section 5.1a). 10,000 mt times 3.2181 equals 32,181. Increasing this to account for discards (1.3% based on the last assessment of U.S. discards - no information is available on Canadian discards but there is no information to suggest that they should be very different than U.S. discards) results in a Canadian catch of 32,605 mt. This analysis does not suggest that this is what 2011 Canadian catch is likely to be, just that it appears relatively rare that 2011 Canadian catch would exceed this amount given 2010 U.S. landings performance. Returning to the original equation in the preceding paragraph, 80,000 mt - 32,605 mt = 47,395 mt, i.e. the U.S. ABC considered in the preferred alternative 1a.

1b (status quo) - In recent specifications the estimate for expected Canadian catch has been the highest Canadian catch in the most recent 5 years of data. This resulted in a Canadian expected catch estimate of 55,000 mt. 211,000 mt - 55,000 mt = 156,000 mt, the status quo U.S. ABC.

1c (monitoring committee recommendation) - The monitoring committee examined correlations over 1960-2009 between one year's Canadian landings and A) previous Canadian landings and B) a 3 year average. Since currently the most recent Canadian data we have is from 2009 and we are trying to estimate 2011 expected Canadian landings, a two year time lag was utilized. The single previous year had a stronger correlation than averages (0.71 versus 0.54) so the Monitoring Committee recommended using the most recent Canadian data for 2009 as an estimate for 2011 expected Canadian landings, which the most current information suggests was 41,016 mt. This is higher than a preliminary number originally utilized by the Monitoring Committee (supplied by Canadian DFO) but additional Canadian landings were reported and the members of the Monitoring Committee all recommended using the most current information available. Increasing 41,016 mt landings to account for 1.3 % assumed discards produces a catch of 41,556 mt. 80,000 mt - 41,556 mt = 38,444 mt, the U.S. ABC for alternative 1c. Limiting the analysis to data since 1994 (see 1a) produced similar results.