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

MAR 1 2 2012

To All Interested Government Agencies and Public Groups:

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

TITLE: Framework Adjustment 47 to the Northeast Multispecies FMP Including an Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis

LOCATION: Atlantic Exclusive Economic Zone

SUMMARY: This action is part of the biennial review process established in the FMP to develop annual catch limits (ACLs) and revise management measures necessary to rebuild overfished groundfish stocks and achieve the goals and objectives of the FMP. Framework 47 was developed to respond to recent stock assessments and updated stock information, as well as to revise management measures after the fishery has operated for 1 year under ACLs and accountability measures (AMs).

RESPONSIBLE
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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 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,

Patricia A. Montanio
NEPA Coordinator

Enclosure

Framework Adjustment 47
To the Northeast Multispecies FMP

Including an

Environmental Assessment
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

Prepared by the
New England Fishery Management Council
In consultation with the
Mid-Atlantic Fishery Management Council
National Marine Fisheries Service

Initial Framework Meeting:	September 28, 2011
Final Framework Meeting:	November 16, 2011
Date Submitted:	February 6, 2012
Date Revised:	March 9, 2012

1.0 Executive Summary

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (M-S Act). The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts. The FMPs have been updated through a series of amendments and framework adjustments. The most recent multispecies amendment, published as Amendment 16, was submitted for review by the National Marine Fisheries Service in October 2009 and became effective on May 1, 2010. This amendment adopted a broad suite of management measures in order to achieve fishing mortality targets and meet other requirements of the M-S Act. Included in Amendment 16 was a process for setting specifications for the fishery and updating measures through framework actions. Framework 44 to the FMP set specifications for fishing years (FY) 2010-2012. It became effective concurrently with Amendment 16 on May 1, 2010. Framework 45 modified several management measures to improve administration of the fishery and revised several specifications; it was implemented May 1, 2011. Framework 46 was implemented September 14, 2011 and modified the provisions that restrict mid-water trawl catches of haddock. This framework would provide additional modifications to the management program.

Amendment 16 made major changes to the FMP. For several groundfish stocks, the mortality targets adopted by Amendment 16, and the resulting specifications in Framework 44, represented substantial reductions from existing levels. For other stocks, the mortality targets were at or higher than existing levels and mortality could remain the same or even increase. Because most fishing trips in this fishery catch a wide range of species, it is impossible to design effort control measures that will change mortality in a completely selective manner for individual species. The management measures adopted by Amendment 16 to reduce mortality where necessary were also expected to reduce fishing mortality unnecessarily on other, healthy stocks. As a result of these lower fishing mortality rates, yield from healthy stocks could be sacrificed and the management plan may not provide optimum yield - the amount of fish that will provide the greatest overall benefit to the nation. Amendment 16 created opportunities to target these healthy stocks. The FMP allows vessels with groundfish permits to either fish under the days-at-sea (DAS) effort control system or to join sectors, which are small groups of self-selected fishermen that receive an allocation of annual catch entitlement (ACE) based upon the catch history of each member. The Amendment also adopted a system of Annual Catch Limits (ACLs) and Accountability Measures (AMs) that are designed to ensure catches remain below desired targets.

This framework action would continue to improve management of the fishery. It incorporates the results of new stock assessments into the setting of specifications and selection of rebuilding strategies. It also makes several modifications to the administration of Annual Catch Limits (ACLs) and Accountability Measures (AMs). These measures are being modified in response to experience with the management program in FY 2010.

The *need* for this action is two-fold: First, to set specifications for FY 2012 -2014 that are consistent with the best available science and second, to modify management measures in order to ensure that overfishing does not occur. There are several *purpose*s: to revise status determination criteria, to revise the Georges Bank yellowtail flounder rebuilding strategy, to adopt specifications, to adopt measures for the U.S./Canada Total Allowable Catches (TACs), to modify management measures for SNE/MA winter flounder, to modify scallop fishery restrictions for catches of yellowtail flounder, and to modify AMs.

Proposed Action

If NMFS implements the Preferred Alternatives identified in this document, this action would implement a range of measures designed to update specifications for the fishery and modify measures to achieve mortality targets and enhance fishery administration. Details of the measures summarized below can be found in Section 4.0. If NMFS implements the Preferred Alternatives, the following measures would be implemented. The measures are divided into two broad themes: updates to status determination criteria, formal rebuilding programs, and ACLs; and commercial and recreational fishery measures.

The Preferred Alternatives include:

- *Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits:*

    - *Revised Status Determination Criteria for three winter flounder stocks and Gulf of Maine cod.* These changes would incorporate the results of recent assessments into the management program and would be used for setting catch levels.

    - *Georges Bank yellowtail flounder rebuilding strategy:* The rebuilding strategy would be modified to rebuild the stock by 2032 with a fifty percent probability of success.

        - *U.S./Canada Resource Sharing Understanding TACs:* Hard TACs for the U.S./Canada Management Area would be specified for FY 2012 that are consistent with the recommendations of the Transboundary Management Guidance Committee (TMGC).

    - *Changes to the administration of scallop fishery groundfish sub-ACLs:* Two measures would be adopted. The first would implement AMs for the scallop fishery only if overall ACLs are exceeded or the scallop fishery exceeds its sub-ACL by 50 percent or more. The second would use in-season data, when possible, to recalculate the amount of yellowtail flounder in the scallop fishery sub-ACL.

    - *Annual catch limit specifications:* New Acceptable Biological Catches (ABCs) and ACLs would be adopted for FY 2012 – 2014 for seven stocks; for the remaining stocks, the FY 20102 specifications adopted by FW 44 or FW 45 would be used until updated assessments can be completed in February 2012.

- *Commercial and Recreational Fishery Measures:* These measures, based on the Preferred Alternatives, would primarily affect commercial fishing.

- *Management Measures for SNE/MA winter flounder:* Possession of this stock would continue to be prohibited if the preferred No Action alternative is adopted.

- *Scallop catch of yellowtail flounder in GB access areas:* The existing cap that limits the catches of yellowtail flounder in the Georges Bank access areas to 10 percent of the ACL would be eliminated.

- *Atlantic wolffish:* Possession of this species would continue to be prohibited. This is the No Action alternative.

- *Common pool restricted gear areas:* The restricted gear areas for common pool vessels that were adopted in Amendment 16 would be eliminated.

- *Accountability Measures:* A number of changes would be made to the existing AMs. Area-based AMs would be adopted for both windowpane flounder stocks and ocean pout that would require the use of selective trawl gear in defined areas if the ACLs are exceeded. Possession of Atlantic halibut would be prohibited if the ACL is exceeded. In the case of SNE/MA winter flounder and Atlantic wolffish, the no-possession requirement would be considered a proactive AM.

Summary of Environmental Consequences

The environmental impacts of all of the alternatives under consideration are described in Section 7.0. Biological impacts are described in Section 7.1, impacts on endangered and other protected species are described in Section 7.2.3, impacts on essential fish habitat are described in Section 7.2, the economic impacts are described in Section 7.4, and social impacts are described in Section 0. Cumulative effects are described in Section 7.6. Summaries of the impacts should the Proposed Action be based on the Preferred Alternatives are provided in the following paragraphs.

Biological Impacts

The measures that constitute the Preferred Alternatives are designed to achieve the rebuilding objectives for the Northeast Multispecies fishery. The most important biological impact of the proposed measures is that they would control fishing mortality on Northeast Multispecies stocks in order to prevent (or end) overfishing and rebuild overfished stocks. The critical measure for these impacts is the specification of ACLs based on the most recent assessments and the revised GB yellowtail flounder rebuilding plan. The preferred changes to AMs would also contribute to achieving these objectives by providing better control of fishery catches.

Essential Fish Habitat (EFH) Impacts

No significant adverse impacts on EFH are expected to result from the Preferred Alternatives. Impacts are expected to be neutral, and the overall low fishing effort expected as a result of this action expected to benefit habitat by reducing the interaction of groundfish fishing vessels with EFH.

Impacts on Endangered and Other Protected Species

None of the Preferred Alternatives in Framework 47 are likely to produce adverse impacts to protected species beyond those described in previous regulations. As with EFH, the impacts are not quantifiable but are expected to be beneficial as a result of an overall low level of groundfish fishing effort resulting from the modifications in this.

Economic Impacts
The most important determinant of the economic impacts of the Preferred Alternatives would be the ABCs/ACLs, and the critical issue is the ABCs/ACLs for GOM cod and GB yellowtail flounder. This document analyzes a range of possible GOM cod ABCs as part of the Preferred Alternative. At the low end of the range of possible ABCs for GOM cod the economic impacts are expected to be severe and negative. Groundfish fishery revenues would decline by about 25 percent when compared to FY 2010 and the revenue losses would fall most heavily on smaller vessels that fish from Maine, New Hampshire, and Massachusetts ports. At the upper end of the range for GOM cod, the decline in the GB yellowtail flounder ACL (when compared to No Action) becomes more important and the losses in revenue are shifted to a different group of vessels from RI and southern New England.

The economic impacts of other Preferred Alternative measures on the groundfish fishery are minor when compared to those of the ABC/ACLs. The revisions to the AMs may cause short-term economic losses if they are triggered but over the long-term the industry should benefit from keeping catches under target levels. Changes to the administration of the scallop fishery sub-ACLs, and removal of the access area yellowtail flounder cap, would be expected to benefit the scallop fishery by reducing derby effects caused by the existing access area cap.

Social Impacts
The Preferred Alternatives could have negative social impacts primarily due to the possibility of a large reduction in the GOM cod ABC/ACL. The new ABCS/ACLs are the most likely to affect attitudes towards management, and a low GOM cod ABC/ACL would result in negative social impacts and would cause severe disruption to many communities, particularly those that are used by smaller vessels that fish in the inshore Gulf of Maine. Other measures are less likely to result in major social impacts.

Cumulative Effects
The Preferred Alternatives are expected to have beneficial effects for managed resources. Updating fishery specifications, improving program administration, and modifying effort controls should increase the likelihood of achieving mortality targets and lead to increased stock sizes. The proposed measures are not expected to have substantial cumulative effects on non-target species, protected resources, or habitat (including essential fish habitat). While fishery specifications are not expected to have impacts on human communities when compared to the No Action alternative, updates in program administration generally have positive impacts, and modifying effort controls have mixed impacts on communities.

Alternatives to the Proposed Action

If NMFS implements the Preferred Alternatives, there are a number of alternatives that would not be adopted. In most (but not all) cases these alternatives are the No Action alternatives. These alternatives are briefly described below.

- *Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits:*
    - *Revised Status Determination Criteria for three winter flounder stocks and Gulf of Maine cod.* The No Action alternative would not update the status

determination criteria for these stocks based. Using the old criteria would not be consistent with recently completed assessments and would not comply with requirements to use the best available science.

- *Georges Bank yellowtail flounder rebuilding strategy:* The No Action alternative would keep the strategy of targeting rebuilding by 2016 with a median probability of success. An additional alternative that was considered would rebuild by 2024 with a median probability of success.

- *U.S./Canada Resource Sharing Understanding TACs:* The No Action alternative would not adopt hard TACs for the U.S./Canada Management Area for FY 2012 that are consistent with the recommendations of the Transboundary Management Guidance Committee (TMGC).

- *Changes to the administration of scallop fishery groundfish sub-ACLs:* The No Action alternative would not modify the administration of scallop fishery sub-ACLs. Scallop fishery AMs would be triggered if the yellowtail flounder sub-ACL for the scallop fishery was exceeded, even if the overall ACL was not. There would not be any in-season recalculation of the amount of yellowtail flounder the scallop fishery was expected to catch.

- *Annual catch limit specifications:* The No Action alternative would not update the specifications. For almost all stocks ABCs and ACLs would be specified for FY 2012 because they were adopted by FW 44, but they would not be specified for FY 2013 and beyond. Pollock ABCs and ACLs were specified for FY 2012 – 2014 in FW 45.

- *Commercial and Recreational Fishery Measures:* These measures would primarily affect commercial fishing.

    - *Management Measures for SNE/MA winter flounder:* An alternative was considered that would have allowed commercial fishing vessels to land SNE/MA winter flounder. Sectors would have been allocated the stock based on the potential sector contribution (PSC) of sector members and fishing for this stock would have been subject to all sector rules. Common pool vessels would have been allowed to retain this stock subject to any measures adopted by NMFS to control catches.

    - *Scallop catch of yellowtail flounder in GB access areas:* The No Action alternative would retain the existing cap that limits the catches of yellowtail flounder in the Georges Bank access areas to 10 percent of the.

    - *Atlantic wolffish:* The alternative to No Action would have allowed retention of one Atlantic wolffish per trip.

    - *Common pool restricted gear areas:* The No Action alternative would retain the restricted gear areas for common pool vessels that were adopted in Amendment 16.

- *Accountability Measures:* The No Action alternative would not modify the AMs for ocean pout, both windowpane flounder stocks, Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder. The AMs for ocean pout, Atlantic halibut, and windowpane flounder would rely on no possession of these stocks, while for wolffish and SNE/MA winter flounder the AMs would result in area closures for common pool vessels if the sub-ACL was exceeded.

Impacts of Alternatives to the Proposed Action

In many cases, the No Action alternatives would not have met current requirements of the M-S Act.

Biological Impacts
The biological impacts of the other alternatives that were considered would be most important for status determination criteria, the GB yellowtail flounder rebuilding plans, and the setting of ABCs/ACLs. The No Action alternative for status determination criteria and ABCs/ACLs criteria would mean that the best available science would not be used. The No Action alternative for GB yellowtail flounder rebuilding would lead to faster rebuilding of the stock than the Preferred Alternative. Failure to adopt new U.S./Canada TACs would be expected to have negative biological impacts as catches would not reflect recent assessment advice. The No Action alternative for administration of scallop fishery sub-ACLs would have less risk of overfishing than the Preferred Alternative.

Essential Fish Habitat Impacts
Changes to status determination criteria, formal rebuilding strategies, scallop fishery sub-ACL administration, and ABCs/ACLs are not usually expected to have direct impacts on EFH. As a result there may be little difference between the Preferred Alternatives and the other alternatives under consideration. Overall, the indirect impacts of these alternatives would be expected to be minor. The alternatives for change to the commercial and recreational fishery would also be expected to have minor effects on EFH because large changes in fishing effort would not be expected to result from many of the measures.

Impacts on Endangered and Other Protected Species
The alternatives to the Preferred Alternatives for updates to SDCs, formal rebuilding programs, and ABCs/ACLs would be expected to have minor or negligible impacts on endangered and other protected species. The No Action alternative for scallop sub-ACL administration could have increased impacts when compared to the Preferred Alterative because the scallop AMs might be triggered more frequently, leading to shifts in scallop fishing effort. Whether those impacts would be positive or negative is unknown. The changes to the commercial and recreational fishery measures would not be expected not have large impacts on endangered and protected species and in many cases the impacts are unlikely to be different than the Preferred Alternatives.

Economic Impacts
When compared to the Preferred Alternative, the economic impacts of the No Action alternative are not as negative. Because the ABC for GOM cod would not decline, groundfish fishing revenues would likely increase form FY 2010 to FY 2012 and would be higher than for the Preferred Alternative. Other alternative, however, would have negative economic impacts to the scallop fishery as there would be no changes to the administration of scallop fishery sub-ACLs.

Social Impacts

The social impacts of adopting the No Action alternatives for status determination criteria, revised GB yellowtail flounder rebuilding plan, scallop fishery sub-ACL administration, U.S./Canada TACs and ABCs/ACLs would be negative. Failure to use the best available science would lead to negative attitudes towards management and over the long-term may limit fishing opportunities. The impacts of the alternatives for commercial and recreational flashing measures would not be expected to have significant social impacts as many of the measures are applicable to stocks that are not targeted.

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2.0 Contents

2.1 Table of Contents

2.2 List of Tables

2.3 List of Figures

2.4 List of Appendices

Appendix I: Past, Present, and Reasonably Foreseeable Future Actions
Appendix II: Summary of Catch by Sector and Common Pool, FY 2010
Appendix III: Calculation of Northeast Multispecies Annual Catch Limits, FY 2010 – FY 2012
Appendix IV: Analytic Techniques: Development of AM Areas
Appendix V: Catch Projection Output

2.5 List of Acronyms

ABC	Acceptable Biological Catch
ACE	Annual Catch Entitlement
ACL	Annual Catch Limits
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
APA	Administrative Procedures Act
ASAP	Age-structured assessment program; assessment model
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
CAA	Catch at Age
CAI	Closed Area I
CAII	Closed Area II
CC	Cape Cod
CEQ	Council on Environmental Quality
CHOIR	Coalition for the Atlantic Herring Fishery's Orderly, Informed, and Responsible Long-Term Development
CPUE	Catch per unit of effort
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAM	Dynamic Area Management
DAP	Domestic Annual Processing
DAS	Days-at-sea
DEA	Data Envelopment Analysis
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DSEIS	Draft Supplemental Environmental Impact Statement
DSM	Dockside monitoring
DWF	Distant-Water Fleets
E.O.	Executive Order
EA	Environmental Assessment
ECPA	East Coast Pelagic Association
ECTA	East Coast Tuna Association
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ETA	Elephant Trunk Area
F	Fishing mortality rate
FAAS	Flexible Area Action System
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FSCS	Fisheries Scientific Computer System
FSEIS	Final Supplemental Environmental Impact Statement

FW	Framework
FY	Fishing year
GAMS	General Algebraic Modeling System
GB	Georges Bank
GEA	Gear Effects Evaluation
GIFA	Governing International Fisheries Agreement
GIS	Geographic Information System
GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
GRT	Gross registered tons/tonnage
HAPC	Habitat area of particular concern
HCA	Habitat Closed Area
HPTRP	Harbor Porpoise Take Reduction Plan
I/O	Input/output
ICNAF	International Commission for the Northwest Atlantic Fisheries
IFQ	Individual fishing quota
IOY	Initial Optimal Yield
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual transferable quota
IVR	Interactive voice response reporting system
IWC	International Whaling Commission
IWP	Internal Waters Processing
JVP	Joint Venture Processing
LOA	Letter of authorization
LPUE	Landings per unit of effort
LWTRP	Large Whale Take Reduction Plan
M	Natural Mortality Rate
MA	Mid-Atlantic
MA DMF	Massachusetts Division of Marine Fisheries
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MARFIN	Marine Fisheries Initiative
ME DMR	Maine Department of Marine Resources
MEY	Maximum economic yield
MMC	Multispecies Monitoring Committee
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fishery Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum sustainable yield
MWT	Midwater trawl; includes paired mid-water trawl when referring to fishing activity or vessels in this document
mt	Metric Tons
NAO	North Atlantic Oscillation
NAPA	National Academy of Public Administration
NAS	National Academy of Sciences
NEFMC	New England Fishery Management Council

NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NLCA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NSGs	National Standard Guidelines
NSTC	Northern Shrimp Technical Committee
NT	Net tonnage
NWA	Northwest Atlantic
OBDBS	Observer database system
OCS	Outer Continental Shelf
OFL	Overfishing Limit
OLE	Office for Law Enforcement (NMFS)
OY	Optimum yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PS/FG	Purse Seine/Fixed Gear
PSC	Potential Sector Contribution
RFA	Regulatory Flexibility Act
RFFA	Reasonably Foreseeable Future Action
RIR	Regulatory Impact Review
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation
SAP	Special Access Program
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SCAA	Statistical catch-at-age assessment model
SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
SFMA	Southern Fishery Management Area (monkfish)
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TALFF	Total Allowable Level of Foreign Fishing
TC	Technical Committee
TED	Turtle excluder device
TEWG	Turtle Expert Working Group

TMGC	Trans-boundary Management Guidance Committee
TMS	Ten minute square
TRAC	Trans-boundary Resources Assessment Committee
TRT	Take Reduction Team
TSB	Total stock biomass
USAP	U.S. At-Sea Processing
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VEC	Valued Ecosystem Component
VMS	Vessel monitoring system
VPA	Virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
WO	Weighout
YPR	Yield per recruit

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3.0 Introduction and Background

3.1 Background

The primary statute governing the management of fishery resources in the Exclusive Economic Zone (EEZ) of the United States is the Magnuson-Stevens Fishery Conservation and Management Act (M-S Act). In brief, the purposes of the M-S Act are:

> (1) to take immediate action to conserve and manage the fishery resources found off the coasts of the United States;
>
> (2) to support and encourage the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species;
>
> (3) to promote domestic and recreational fishing under sound conservation and management principles;
>
> (4) to provide for the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery;
>
> (5) to establish Regional Fishery Management Councils to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revisions of such plans under circumstances which enable public participation and which take into account the social and economic needs of the States.

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the M-S Act.

The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, yellowtail flounder, ocean pout, and Atlantic wolffish) off the New England and Mid-Atlantic coasts. Some of these species are sub-divided into individual stocks that are attributed to different geographic areas. Commercial and recreational fishermen harvest these species. The FMP has been updated through a series of amendments and framework adjustments.

Amendment 16, which became effective on May 1, 2010, was the most recent amendment to adopt a broad suite of management measures in order to achieve the fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act. In 2011, the NEFMC also approved Amendment 17, which allowed for NOAA-sponsored state-operated permit banks to function within the structure of Amendment 16. Amendment 16 greatly expanded the sector management program and adopted a process for setting Annual Catch Limits that requires catch levels to be set in biennial specifications packages. Several lawsuits are challenging various provisions of Amendment 16, including the amendment's provisions related to sectors and some of the accountability measures.

Three framework adjustments have updated the measures in Amendment 16. The first, published as Framework 44, became effective on May 1, 2010 concurrently with Amendment 16. It adopted the required specifications for regulated northeast multispecies stocks for fishing years 2010-2012, as well as stocks managed by the U.S./Canada Resource Sharing Agreement. It was also used to incorporate the best available information in adjusting effort control measures adopted in Amendment 16. Framework 45 became effective on May 1, 2011. It built upon revisions made to the sector program in Amendment 16 and Framework 44, set specifications required under the U.S./Canada Resource Sharing Agreement, and incorporated an updated stock assessment for pollock. Finally, Framework 46 was implemented in September 14, 2011 and modified the provisions that restrict mid-water trawl catches of haddock.

This framework is primarily intended to set specifications for FY 2012-2014 as required by Amendment 16, including those developed under the U.S./Canada Resource Sharing Agreement and incorporating updated stock assessments. It will also build upon revisions made to the fishery administration program in Amendment 16 and Frameworks 44 through 46.

3.2 Purpose and Need for the Action

The Northeast Multispecies FMP requires that the NMFS Regional Administrator, after consultation with the Council, determine the specifications for the groundfish fishery. The FMP requires the Council and the Regional Administrator to review the best available information regarding the status of the resource and fishery and develop appropriate fishery specifications. Previous amendments to the FMP established processes to evaluate fishing mortality and rebuilding progress. If necessary as a result of these evaluations, periodic framework adjustments were planned to facilitate any changes to the management program that may prove necessary in order to comply with the rebuilding programs and to provide an opportunity to adjust other management measures as necessary.

In 2011, the International Fisheries Agreement Clarification Act was modified so that for stocks subject to the U.S./Canada Resource Sharing Understanding, it is possible to exceed the catch levels otherwise required under the Northeast Multispecies Fishery Management Plan if certain conditions are met (described in Section 4.1.2). This change in the law, in addition to scientific reviews of rebuilding process, is another source of need to consider the adjustment of management measures.

Additionally, several elements of Amendment 16 have been updated in recent frameworks in order to allow the fishery to operate more effectively and to ensure that overfishing does not occur. This framework similarly proposes several modifications of that nature.

These specifications and adjustments to Amendment 16, listed in the following table, are intended to meet the goal and many of the objectives of the Northeast Multispecies FMP, as modified in Amendment 16.

To better demonstrate the link between the purpose and need for this action, the following table summarizes the need for the action and corresponding purposes.

Need for Framework 47	***Corresponding Purpose For Framework 47***
Set specifications for ACLs in Fishing Years 2012-2014 consistent with best available science, the ABC control rules adopted in Amendment 16 to the Northeast Multispecies FMP, the International Fisheries Agreement Clarification Act, and the most recent relevant law	• Revisions to status determination criteria, including updated winter flounder assessments • Revision of rebuilding strategy for GB yellowtail flounder • Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs • Measures to adopt TACs for U.S./Canada area
Modify management measures in order to ensure that overfishing does not occur consistent with the status of stocks, the National Standard guidelines, and the requirements of the MSA of 2006	• Modification of management measures for SNE/MA winter flounder • Modification of restrictions on the catch of yellowtail flounder in Georges Bank access areas • Modification of accountability measures for certain stocks

3.3 Brief History of the Northeast Multispecies Management Plan

Groundfish stocks were managed under the M-S Act beginning with the adoption of a groundfish plan for cod, haddock, and yellowtail flounder in 1977. This plan relied on hard quotas (total allowable catches, or TACs), and proved unworkable. The quota system was rejected in 1982 with the adoption of the Interim Groundfish Plan, which relied on minimum fish sizes and codend mesh regulations for the Gulf of Maine and Georges Bank to control fishing mortality. The interim plan was replaced by the Northeast Multispecies FMP in 1986, which established biological targets in terms of maximum spawning potential and continued to rely on gear restrictions and minimum mesh size to control fishing mortality. Amendment 5 was a major revision to the FMP. Adopted in 1994, it implemented reductions in time fished (days-at-sea, or DAS) for some fleet sectors and adopted year-round closures to control mortality. A more detailed discussion of the history of the management plan up to 1994 can be found in Amendment 5 (NEFMC 1994). Amendment 7 (NEFMC 1996), adopted in 1996, expanded the DAS program and accelerated the reduction in DAS first adopted in Amendment 5. After the implementation of Amendment 7, there were a series of amendments and smaller changes (framework adjustments) that are detailed in Amendment 13 (NEFMC 2003). Amendment 13 was developed over a four-year period to meet the M-S Act requirement to adopt rebuilding programs for stocks that are overfished and to end overfishing. Amendment 13 also brought the FMP into compliance with other provisions of the M-S Act. Subsequent to the implementation of Amendment 13, FW 40A provided opportunities to target healthy stocks, FW 40B improved the effectiveness of the effort control program, and FW 41 expanded the vessels eligible to participate in a Special Access Program (SAP) that targets GB haddock. FW 42 included measures to implement the biennial adjustment to the FMP as well as a Georges Bank yellowtail rebuilding strategy, several changes to the Category B (regular) DAS Program and two Special Access Programs, an extension of the DAS leasing program, and introduced the differential DAS system. FW 43 adopted haddock catch caps for the herring fishery and was implemented August 15, 2006. Amendment 16 was adopted in 2009 and provided major changes in the realm of groundfish management. Notably, it greatly expanded the sector program and implemented Annual Catch Limits in compliance with 2006 revisions to the M-S Act. The amendment also included a host of mortality reduction measures for "common pool" (i.e. non-sector) vessels and the recreational component of the fishery. Framework 44 was also adopted in 2009, and it set specifications for FY 2010 – 2012 and incorporated the best available information in adjusting effort control measures adopted in Amendment 16. Framework 45 was approved by the Council in 2010 and adopts further modifications to the sector program and fishery specifications; it was implemented May 1, 2011. Two more revisions to the FMP have been approved by the NEFMC. Framework 46, which revised the allocation of haddock to be caught by the herring fishery, was implemented in August 201. Amendment 17, which authorizes the function of NOAA-sponsored state-operated permit bank, is under review and is expected to be implemented in 2012. A more detailed description of the history of the FMP is included in Amendment 16, and each of these actions can be found on the internet at http://www.nefmc.org.

3.4 National Environmental Policy Act (NEPA)

NEPA provides a structure for identifying and evaluating the full spectrum of environmental issues associated with Federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is a combined framework adjustment to a fishery management plan and an environmental assessment (EA). An EA provides an analysis of a Proposed Action, the alternatives to that action that were considered, and the impacts of the action and the alternatives. An EA is prepared rather than an Environmental Impact Statement (EIS) when the environmental impacts are not expected to be significant. The required NEPA elements for an EA are discussed in Section 8.2.1. The evaluation that this action will not have significant impacts is in Section 8.2.2, and the required Finding of No Significant Impact (FONSI) statement is included at the end of that section.

4.0 Alternatives Under Consideration

4.1 Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits

4.1.1 Revised Status Determination Criteria for Winter Flounders and Gulf of Maine Cod

4.1.1.1 Option 1: No Action

If no action is adopted, there will be no revisions to status determination criteria for the Georges Bank, Gulf of Maine, or Southern New England/Mid-Atlantic winter flounder stocks, or Gulf of Maine cod. The following criteria, as implemented in Amendment 16, would apply:

Table 1 – No Action status determination criteria for winter flounder stocks

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Gulf of Maine Winter Flounder	SSBMSY: SSB/R (40%MSP)	½ Btarget	F40%MSP
GB Winter Flounder	SSBMSY: SSB/R (40%MSP)	½ Btarget	F40%MSP
SNE/MA Winter Flounder	SSBMSY: SSB/R (40%MSP)	½ Btarget	F40%MSP
GOM cod	SSB_{MSY}: SSB/R (40%MSP)	½ Btarget	F40% MSP

Numerical estimates of SDCs are in Table 2.

Table 2 – No Action numerical estimates of SDCs for winter flounder and GOM cod stocks

Stock	Model	Bmsy or proxy (mt)	Fmsy or proxy	MSY (mt)
GB Winter Flounder	VPA	16,000	0.26	3,500
GOM Winter Flounder	VPA	3,792	0.28	917
SNE/MA Winter Flounder	VPA	38,761	0.25	9,742
GOM Cod	VPA	58,248	0.24	10,014

4.1.1.2 Option 2: Revised Status Determination Criteria for Georges Bank, Gulf of Maine, and Southern New England/Mid-Atlantic Winter Flounder Stocks and GOM Cod (*Preferred Alternative*)

The M-S Act requires that every fishery management plan specify "objective and measureable criteria for identifying when the fishery to which the plan applies is overfished." Guidance on this requirement identifies two elements that must be specified: a maximum fishing mortality threshold (or reasonable proxy) and a minimum stock size threshold. The M-S Act also requires that FMPs specify the maximum sustainable yield and optimum yield for the fishery. Amendment 16 adopted status determination criteria for regulated groundfish stocks as determined by the GARM III (NEFSC 2008) and, in the case of Atlantic wolffish, the DPWG (2009). Framework 45 updated status determination criteria for Atlantic pollock to reflect the results of an additional assessment conducted in 2010.

The NEFSC conducted new assessments for the three New England winter flounder stocks in 2011. These assessments adopted a new model and recommended revised status determination criteria for each stock (NEFSC 2011). This action adopts the revised status determination criteria for these stocks. The review panel recommended the criteria and numerical values in Table 3 and Table 4.

The NEFSC completed an assessment for GOM cod in December 2011. The reference points for this stock may also change but the details are not known.

Table 3 – Option 2 status determination criteria for winter flounder stocks and GOM cod

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Gulf of Maine Winter Flounder	Undefined	Undefined	F40%MSP
GB Winter Flounder	SSB_{MSY}	½ SSBMSY	FMSY
SNE/MA Winter Flounder	SSB_{MSY}	½ SSBMSY	F_{MSY}
GOM Cod	SSB_{MSY} or a proxy for SSB_{MSY}	½ SSB_{MSY} or the SSB_{MSY} proxy	F_{MSY} or a proxy for F_{MSY}

Numerical estimates of SDCs are in Table 4.

Table 4 – Option 2 numerical estimates of SDCs for winter flounder stocks and GOM cod

Stock	Model	Bmsy or proxy (mt)	Fmsy or proxy	MSY (mt)
GOM Winter Flounder	Swept Area Biomass	Undefined	0.31	Undefined
GB Winter Flounder	VPA	10,100	0.42	3,700
SNE/MA Winter Flounder	ASAP/SCAA	43,661	0.290	11,728
GOM cod	ASAP	30,000 – 100,000 mt	0.1 – 0.5	5,000 – 15,000 mt

Rationale: These revised SDCs represent the best available science for estimates of the fishing mortality threshold, biomass target, and MSY for these four stocks. As such, this measure ensures the FMP remains in compliance with National Standard 2 of the M-S Act.

4.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

4.1.2.1 Option 1: No Action

The current rebuilding strategy for Georges Bank yellowtail flounder, adopted in FW 45, uses a fishing mortality target that is calculated to rebuild the stock by 2016 with a 50 percent probability of success.

4.1.2.2 Option 2: Revised Rebuilding Strategy for Georges Bank Yellowtail Flounder (*Preferred Alternative*)

Two options are being considered for a revised rebuilding strategy for GB yellowtail flounder.

Sub-Option A: The rebuilding strategy would be to rebuild the stock with a median probability of success by 2023. This strategy is based on fishing at a fishing mortality rate (75% of F_{MSY}) consistent with the default ABC control rule adopted by Amendment 16.

Sub-Option B (*Preferred Alternative*): The rebuilding strategy would be to rebuild the stock with a median probability of success by 2032. This strategy is based on fishing at a fishing mortality rate that was based on analyses that considered two different criteria. The first was a rate that would, on average, increase SSB by 10 percent per year. The second was the maximum fishing mortality calculated to achieve SSB_{MSY}. The fishing mortality rate for both, when estimated in 2011, was nearly identical.

Rationale: In 2011, the International Fisheries Agreement Clarification Act (IFACA) was modified so that for stocks subject to the U.S./Canada Resource Sharing Understanding, it is possible to “exceed the catch levels otherwise required under the Northeast Multispecies Fishery Management Plan if--

(A) overfishing is ended immediately;

(B) the fishing mortality level ensures rebuilding within a time period for rebuilding specified taking into account the Understanding pursuant to paragraphs (1) and (2) of this subsection; and

(C) such catch levels are consistent with that Understanding.”

In light of the changed law, the stock is exempted from the ten-year requirement for rebuilding, as long as it is rebuilt as quickly as possible and overfishing is ended immediately, taking into account communities and other factors including the purpose and intent of the Understanding itself.

There are other provisions of the M-S Act and IFACA that should be considered when selecting the rebuilding strategy. M-S Act rebuilding requirements specified in section 304(e)(4)(A)(i) include the requirements that the FMP or amendment must specify a time period for rebuilding that is as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem. IFACA, however, states that for the stocks covered by the U.S./Canada Resource Sharing Understanding, the Understanding and decisions made under the Understanding should be taken into account in the application of this section. In other words, the Understanding and decisions made under the Understanding should be considered when determining the period that is as short as possible.

Section 304(e)4(A)(ii) of the M-S Act says that generally the rebuilding period should not exceed 10 years except in cases where the biology of the stock of fish and other environmental conditions, or management measures under an international agreement, dictate otherwise. IFACA states that decisions made under the Understanding should be considered “management measures under an international agreement” that “dictate otherwise.”

The application of these provisions to the two sub-options is as follows:

Sub-Option A: The fishing mortality rate used for determining the time period is 75% of F_{MSY} , or 0.1875 (future adjustments may increase or decrease this mortality rate needed to rebuild by the end of the period). The predicted rebuilding period extends beyond ten years since the initial year was 2006 and would be 17 years if the current retrospective pattern in the assessment continues. Since the harvest strategy for the U.S./Canada Resource Sharing Understanding is to have a low risk of exceeding F_{ref} (F_{MSY} proxy, or 0.25) when stock conditions are poor, this strategy is consistent with the Understanding. Because of differences between U.S. and Canadian legal requirements it is not likely that a lower mortality target could be negotiated as the basis for annual catches. As a result, this is the shortest time period that is possible after taking into account decisions named under the Understanding. This sub-option does reduce yields, however, when compared to sub-Option B and so does not consider the needs of fishing communities to the same extent.

Sub-Option B: The fishing mortality rate used for determining the time period is 0.21 (future adjustments may increase or decrease this mortality rate needed to rebuild by the end of the period). The predicted rebuilding period extends beyond ten years since the initial year was 2006 and would be 26 years if the current retrospective pattern continues. Since the harvest strategy for the U.S./Canada Resource Sharing Understanding is to have a low risk of exceeding F_{ref} (F_{MSY} proxy, or 0.25) when stock conditions are poor, this strategy is consistent with the Understanding. This mortality rate is about 12 percent higher than that used in sub-option A. This results in slightly higher catches, which gives more flexibility for negotiating catches with Canada under the terms of the Understanding. As a result it also better addresses the needs of fishing communities when compared to sub-option A.

4.1.3 U.S./Canada Resource Sharing Understanding TACs

4.1.3.1 Option 1: No Action

If no action is taken on specifications, the recommendations of the TMGC would also not be implemented and there would be no TAC for EGB cod, haddock, or GB yellowtail flounder in the U.S./Canada area for FY 2012. Vessels would still be constrained by the other regulations of the FMP, including days-at-sea (DAS), sector regulations, and closed areas.

4.1.3.2 Option 2: U.S./Canada TACs (*Preferred Alternative*)

This alternative would specify TACs for the U.S./Canada Management Area for FY 2012 as indicated in Table 5 below. These TACs would be in effect for the entire fishing year, unless NMFS determines that FY 2011 catch of GB cod, haddock, or yellowtail flounder from the U.S./Canada Management Area exceeded the pertinent 2011 TAC. If the TAC in a particular fishing year is exceeded, the Understanding and the regulations require that the TAC for the subsequent fishing year is reduced by the amount of the overage. In order to minimize any disruption to the fishing industry, NMFS would attempt to make any necessary TAC adjustment in the first quarter of the fishing year.

The percentage share for the U.S. would increase by 5 percent for cod in FY 2012 compared to FY 2011 and would decrease by 6 percent for yellowtail in FY 2012. The percentage share for the U.S. would not change for haddock. Each country's percentage share is based on a formula that accounts for historic catch and current resource distribution. For FY 2012, the weighting formula used to determine the percentage shares would be 90/10 (resource distribution/historic catch). More information on the calculation of the percentage shares is available on the TMGC website at the following address:
http://www.mar.dfo-mpo.gc.ca/science/tmgc/background/share.pdf.

Table 5 - Proposed FY 2012 U.S./Canada TACs (mt) and Percentage Shares

TAC	Eastern GB Cod	Eastern GB Haddock	GB Yellowtail Flounder
Total Shared TAC	675	16,000	1,150
U.S. TAC	162 (24%)	6,880 (43%)	564 (49%)
Canada TAC	513 (76%)	9,120 (57%)	586 (51%)

A comparison of the proposed FY 2012 U.S. TACs and the FY 2011 U.S. TACs is shown in Table 6. Changes to the U.S. TACs reflect changes to the percentage shares, stock status, and the TMGC recommendations.

Rationale: The U.S. and Canada coordinate management of three stocks that overlap the boundary between the two countries on Georges Bank. Agreement on the amount to be caught is reached each year by the Transboundary Management Guidance Committee (TMGC). This measure would adopt the recommendations of the TMGC. It makes sure that catches are consistent with the most recent assessments of those stocks.

Table 6 - Comparison of the Proposed FY 2012 U.S. TACs and the FY 2011 U.S. TACs (mt)

Stock	U.S. TAC		Percent Change
	FY 2012	FY 2011	
Eastern GB cod	162	200	– 19 %
Eastern GB haddock	6,880	9,460	– 27 %
GB yellowtail	564	1,458	– 61 %

4.1.4 Administration of Scallop Fishery Sub-ACLs

4.1.4.1 Option 1: No Action

There would not be any changes to the way scallop fishery sub ACLs are administered. When the sub-ACL is caught, it would result in the implementation of the applicable AMs.

Rationale: Under the multispecies AM system, the ABC is distributed into various sub-components. This approach partitions the overall fishing mortality among different components. In order to have the greatest likelihood that mortality targets will be achieved over the long term it is important that each component remain within its allocation. The AM system is designed to automatically correct if one of the components – such as the scallop fishery – catches more than it is allocated. For this reason, the catch of each component is compared to its sub-ACL to determine when AMs would be implemented.

4.1.4.2 Option 2: Changes to Scallop Fishery Sub-ACL Administration – AM Implementation *(Preferred Alternative)*

Scallop fishery sub-ACLs would be administered and evaluated in the context of total catches in the fishery. The general principle is that if a scallop fishery sub-ACL (for any stock) would be exceeded, but the overall ACL was not exceeded, then the scallop fishery would not be subject to AMs unless the scallop fishery sub-ACL was exceeded by 50 or more percent. There would be two criteria that would result in implementing the AMs if either was met:

- The scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded
- The scallop fishery exceeds its sub-ACL for a stock by 50 or more percent

This is modified in the case of stocks that are allocated to groundfish sectors because sectors are allowed to carry-over a portion of unused ACE into the next fishing year. When evaluating whether the total ACL has been exceeded or not, NMFS will account for the maximum amount of carry-over available to the groundfish fishery and add that to the estimate of total catch.

Rationale: The purpose of the ACL and AM system is to prevent overfishing. Overfishing is likely to occur only if the total ACL is exceeded. It makes little sense to sacrifice yield or increase fishing costs from the scallop fishery because of AMs designed to reduce the catch of groundfish stocks if the total ACL for those stocks is not exceeded. At the same time, there is a need to hold the scallop fishery accountable for its catch so if the sub-ACL is exceeded by 50 or more percent the AM is implemented even if the overall ACL is not exceeded.

4.1.4.3 Option 3: In-Season Re-estimation of Scallop Fishery GB Yellowtail Flounder Sub-ACL (*Preferred Alternative*)

A portion of the GB yellowtail flounder ABC is allocated to the scallop fishery as a sub-ACL. This allocation is based on an initial estimate of the amount of GB yellowtail flounder the scallop fishery is expected to catch if it harvests all of the available scallops. The estimate of this catch is prepared and the Council then bases its allocation on a percentage of this estimate. There are no restrictions on the percentage that can be allocated; recent allocations have ranged from 90 percent to more than 100 percent.

This initial estimate is based on past fishing activity and projected changes in stock size for both yellowtail flounder and scallops. Because there is uncertainty in these estimates there is a possibility that the allocation may be either too high or too low. If the initial allocation is too low, the impacts on the scallop fishery are that AMs may triggered if the scallop fishery exceeds its sub-ACL (if the measure in section 4.1.4 Option 2 is adopted, then the AM would only be triggered if the total ACL was also exceeded).

If the estimate is too high then there is a possibility that the available catch will not be harvested, sacrificing yellowtail flounder yield. In order to prevent the loss of available yield of this stock, if this option is adopted NMFS would re-estimate the expected scallop fishery catch of GB yellowtail flounder by January 15 of the fishing year. Should the estimate indicate that the scallop fishery will catch less than 90 percent of the entire sub-ACL, NMFS will reduce the scallop fishery sub-ACL to the amount expected to be caught and increase the groundfish sub-ACL by up to the difference between the original estimate and the revised estimate. The increase in the groundfish sub-ACL will be distributed to sectors and the common pool. If the amount of yellowtail flounder projected to be caught by the scallop fishery exceeds the scallop fishery sub-ACL, there will not be any changes to the sub-ACL.

Rationale: As noted in the description of this measure, the scallop fishery sub-ACL is based on an estimate of the catch, and this estimate is subject to uncertainty. Should it prove to be an over-estimate, without this measure yield would be sacrificed since the groundfish fishery would not be allowed to catch the portion of the scallop sub-ACL that is not harvested. Because in-season estimates of the catch are uncertain, this measure would give NMFS discretion in the size of the changes made to the sub-ACLs – the agency would be allowed to make the change in any amount up to the difference between the old and new estimate. This measure, if adopted, would facilitate catching more of the available yield and would thus facilitate achieving OY for this stock, as required by National Standard 1 of the M-S Act.

4.1.5 Annual Catch Limit Specifications

4.1.5.1 Option 1: No Action

If the No Action option is selected, the specifications for FY 2012 would remain as adopted by FW 44 and FW 45, and there would not be any ABCs defined for FY 2013 and 2014 (with the exception of pollock). There would not be additional sub-ACLs and there would be no changes to the distribution of available catch to various sub-components. The FY 2012 ABCs would be as specified in Table 7.

Table 7 – No Action/Option 1 Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2012 (metric tons, live weight). Values are rounded to the nearest metric ton.
(1) Grayed out values may be adjusted as a result of future recommendations of the TMGC. Values shown for GB haddock and cod are preliminary estimates subject to change.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops Sub-ACL	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ACL	Total ACL
GB Cod(1)	2012	8,090	5,364	54	215	0	4,841		0	4,647	194	0	5,109
GOM Cod	2012	11,742	9,018	598	299	0		4,828	2,826	4,472	356	0	8,551
GB Haddock(1)	2012	51,150	29,016	290	1,161	0	26,132		0	25,609	523	54	27,637
GOM Haddock	2012	1,296	1,013	7	29	0		661	259	630	31	2	959
GB Yellowtail Flounder(1)	2012	4,335	1,222	0	51.2	307.5	686.3		0.0	665.7	20.6	0.0	1045.0
SNE/MA Yellowtail Flounder	2012	3,166	1,003	10	40	126	760		0	552	208	0	936
CC/GOM Yellowtail Flounder	2012	1,508	1,159	12	46	0	1,046			976	70	0	1,104
Plaice	2012	4,727	3,632	36	145	0	3,278			3,067	211	0	3,459

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
Witch Flounder	2012	2,141	1,639	16	66	0	1,479			1,406	73	0	1,561
GB Winter Flounder	2012	3,297	2,543	0	127	0	2,295			2,227	68	0	2,422
GOM Winter Flounder	2012	685	238	60	12	0	158			132	26	0	230
SNE/MA Winter Flounder	2012	2,830	1,198	96	60	0	969			0	969	0	1,125
Redfish	2012	12,036	9,224	92	369	0	8,325			8,041	284	0	8,786
White Hake	2012	5,306	3,638	36	146	0	3,283			3,128	156	0	3,465
Pollock	2014	20,554	16,000	760	1,400	0	13,148		0	12,622	526	0	15,308
N. Window-pane Flounder	2012	317	237	2	69	0	154		0	0	154	0	225

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
S. Window-pane Flounder	2012	317	237	2	69	0	154			0	154	0	225
Ocean Pout	2012	361	271	3	11	0	239			0	239	0	253
Atlantic Halibut	2012	143	85	43	4	0	36			0	36	0	83
Atlantic Wolffish	2012	92	83	1	3	0	73			0	73	0	77

Table 8 – Option 1 preliminary incidental catch TACs for Special Management Programs (metric tons, live weight). These values may change as a result of changes in sector membership.

	Cat B (regular) DAS Program			CAI Hook Gear Haddock SAP			EUS/CA Haddock SAP		
Stock	2010	2011	2012	2010	2011	2012	2010	2011	2012
GB cod	1.7	2.6	2.8	0.6	0.8	0.9	1.2	1.7	1.9
GOM cod	3.4	3.6	3.6						
GB Yellowtail	0.6	0.5	0.5				0.6	0.5	0.5
CC/GOM yellowtail	0.5	0.6	0.7						
SNE/MA Yellowtail	0.9	1.4	2.1						
Plaice	9.2	10.0	10.6						
Witch Flounder	2.1	3.1	3.7						
White Hake	5.2	7.3	9.7						
SNE/MA Winter Flounder	1.1	1.2	1.4						
GB Winter Flounder	1.2	1.4	1.6				1.2	1.4	1.6
Pollock	1.2	1.2	1.2	0.4	0.4	0.4	0.8	0.8	0.8

Table 9 – Proposed CAI Hook Gear Haddock SAP TACs, FY 2010- 2012

Year	Exploitable Biomass (thousand mt)	WGB Exploitable Biomass	B(year)/B2004	TAC (mt, live weight)
2004	78,037	27,313		
2010	291,682	102,089	3.738	4,223.7
2011	218,054	76,319	2.794	3,157.5
2012	177,978	62,292	2.281	2,577.2

4.1.5.2 Option 2: Revised Annual Catch Limit Specifications (*Preferred Alternative*)

If Option 2 were selected, the specifications for FY 2012 through FY 2014 would be as specified in Table 10. This option defines FY 2012 specifications for twelve stocks that were last assessed at GARM III as the values previously established in FW 44 and FW 45. This is because the Council's SSC recommended against using the results of five to seven year projections to define OFLs and ABCs. No specifications are made for FY 2013 and F Y 2014 for these stocks. Updated assessments will be completed in early 2012 and a future action will use those results for setting the FY 2013 – FY 2014 values. The updated assessments may also lead to changes in the FY 2012 values.

For other stocks that are assessed with an index-based assessment, or that have had an assessment recently completed, specifications are defined for the period FY 2012 – 2014.

A benchmark assessment for GOM cod was completed in December 2011. The results will not be available in time for them to be included in this framework. In order to allow the results to be adopted as quickly as possible, the framework considers and analyzes a range of values that are expected to encompass the likely assessment result. The framework also includes the FY 2012 value that was included in FW 44. After the assessment results are completed, the Council's SSC will use the new results to recommend OFLs and ABCs for FY 2012 – 2014, the Council will consider the recommendations at a Council meeting, and the revised values may be included in the proposed and final rule.

To a large extent, the values for specifications are determined by the decisions made on the options in sections 4.1.1, 4.1.2, and 4.1.3 and the decisions made on section 4.2.5 (AMs). If the AMs in that section are adopted, then for ocean pout, both windowpane flounder stocks, and Atlantic wolffish the groundfish fishery will not have a specific sub-ACL and Table 10 will be revised accordingly.

Rationale: This measure would adopt new specifications for groundfish stocks that are consistent with the most recent assessment information.

Table 10 – Option 2 Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2012 – FY 2014 (metric tons, live weight). Values are rounded to the nearest metric ton. *PRELIMINARY VALUES SHOWN BASED ON 2011 SECTOR ROSTERS..*

(1) Grayed out values may be adjusted as a result of future recommendations of the TMGC.

(4) SNE/MAB windowpane flounder without the Mixed Stock Exception and without new sub-ACLs

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Cod[(1)]	2012	7,311	5,103	51	204	0	4,605		0	4,506	100	0	4,861
	2013												
	2014												
GOM Cod	2012	11,742	9,018	598	299	0		4,828	2,826	4,724	104	0	8,551
	Low		500	33	17	0		268	157	262	6	0	474
	High		20,000	1,326	663	0		10,707	6,268	10,477	231	0	18,965
GB Haddock[(1)]	2012	54,150	30,726	307	1,229	0	27,438		0	27,270	168	286	29,260
	2013												
	2014												
GOM Haddock	2012	1,296	1,013	15	22	0		653	259	647	6	9	958
	2013												
	2014												
GB Yellowtail Flounder[(1)]	2012	1,691	564	0	22.6	307.5	217.7		0	214	4	0	547.8
	2013	1,691	564	0	22.6	307.5	217.7		0	214	4	0	547.8
	2014												
SNE/MA Yellowtail Flounder	2012	3,166	1,003	10	40	126	760		0	585	174	0	936
	2013												
	2014												

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
CC/GOM Yellowtail Flounder	2012	1,508	1,159	35	23	0	1,046		0	1,016	30	0	1,104
	2013												
	2014												
Plaice	2012	4,727	3,632	36	145	0	3,278		0	3,204	74	0	3,459
	2013												
	2014												
Witch Flounder	2012	2,141	1,639	49	66	0	1,448		0	1,419	29	0	1,563
	2013		0	0	0	0	0		0	0	0	0	0
	2014		0	0	0	0	0		0	0	0	0	0
GB Winter Flounder	2012	4,839	3,753	0	188	0	3,387		0	3,364	23	0	3,575
	2013	4,819	3,750	0	188	0	3,384		0	3,361	23	0	3,572
	2014	4,626	3,598	0	180	0	3,247		0	3,225	22	0	3,427
GOM Winter Flounder	2012	1,458	1,078	272	54	0	715		0	679	36	0	1,040
	2013	1,458	1,078	272	54	0	715		0	679	36	0	1,040
	2014	1,458	1,078	272	54	0	715		0	679	36	0	1,040
SNE/MA Winter Flounder (2)	2012	2,336	626	175	125	0	303		0	0	303	0	603
	2013	2,637	697	195	139	0	337		0	0	337	0	672
	2014	3,471	912	255	182	0	441		0	0	441	0	879
Redfish	2012	12,036	9,224	92	369	0	8,325		0	8,285	40	0	8,786
	2013												
	2014												

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
White Hake	2012	5,306	3,638	73	109	0	3,283		0	3,252	31	0	3,465
	2013												
	2014												
Pollock	2012	19,887	15,400	754	1,370	0	12,612		0	12,518	94	0	14,736
	2013	20,060	15,600	756	1,380	0	12,791		0	12,695	95	0	14,927
	2014	20,554	16,000	760	1,400	0	13,148		0	13,050	98	0	15,308
N. Window-pane Flounder	2012	230	173	2	33	0	~~129~~		0	0	129	0	163
	2013	230	173	2	33	0	~~129~~		0	0	129	0	163
	2014	230	173	2	33	0	~~129~~		0	0	129	0	163
S. Window-pane Flounder	2012	515	386	39	270	0	~~72~~		0	0	72	0	381
	2013	515	386	39	270	0	~~72~~		0	0	72	0	381
	2014	515	386	39	270	0	~~72~~		0	0	72	0	381
Ocean Pout	2012	342	256	3	23	0	~~214~~		0	0	214	0	240
	2013	342	256	3	23	0	~~214~~		0	0	214	0	240
	2014	342	256	3	23	0	~~214~~		0	0	214	0	240
Atlantic Halibut	2012	143	85	43	4	0	36		0	0	36	0	83
	2013	143	85	43	4	0	36		0	0	36	0	83
	2014	143	85	43	4	0	36		0	0	36	0	83
Atlantic Wolffish	2012	92	83	1	3	0	73		0	0	73	0	77
	2013	92	83	1	3	0	73		0	0	73	0	77
	2014	92	83	1	3	0	73		0	0	73	0	77

Table 11 – Option 2 preliminary incidental catch TACs for Special Management Programs (metric tons, live weight). These values may change as a result of changes in sector membership.

	Cat B (regular) DAS Program			CAI Hook Gear Haddock SAP			EUS/CA Haddock SAP		
Stock	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
GB cod	1.0	0.0	0.0	0.3	0.0	0.0	0.7	0.0	0.0
GOM cod	1.0	0.1	2.3						
GB Yellowtail	0.0						0.0		
CC/GOM yellowtail	0.3		0.0						
SNE/MA Yellowtail	1.7								
Plaice	3.7	0.0	0.0						
Witch Flounder	1.5	0.0	0.0						
White Hake	3.0	3.4	4.4						
SNE/MA Winter Flounder	0.5	0.5	0.4						
GB Winter Flounder	0.3	0.0	0.0				0.3	0.0	0.0
Pollock	0.2	1.0	0.9	0.1	0.3	0.3	0.1	0.7	0.6

Table 12 – Proposed CAI Hook Gear Haddock SAP TACs, FY 2010- 2012

Year	Exploitable Biomass (thousand mt)	WGB Exploitable Biomass	B(year)/B2004	TAC (mt, live weight)
2012	177,978	62,292	2.281	2,577.2

4.2 Commercial and Recreational Fishery Measures

4.2.1 Management Measures for SNE/MA Winter Flounder

4.2.1.1 Option 1: No Action (*Preferred Alternative*)

Landing SNE/MA winter flounder would continue to be prohibited for all commercial and recreational vessels. This stock would not be allocated to sectors.

Rationale: The most recent stock assessment of SNE/MA winter flounder indicated that fishing mortality was well below the F_{MSY} proxy in 2009 and 2010, for the first time in the time series. This coincides with a prohibition on landing this stock that was first implemented May 1, 2009 as an interim rule. As such, it has demonstrated its utility as an effective, proactive AMC for this stock. This measure would be adopted to keep the fishing mortality low for that stock in order to promote rebuilding

4.2.1.2 Option 2: Allocate SNE/MA Winter Flounder to the Groundfish Fishery

Although Amendment 16 did not allocate the SNE/MA winter flounder stock to sectors, it stipulated that this could "…be considered and adopted in the biennial specification or framework process in the event a future allocation can be made available. If an allocation of SNE/MA winter flounder is made, it will be made in the same manner as for other multispecies stocks" (NEFMC 2010).

This measure would create the allocation of SNE/MA winter flounder to sectors in the same manner as the allocation is calculated for other multispecies stocks. This entails using permit history from FY 1996-2006 to calculate a PSC for each vessel in the fishery. All sector provisions would apply to fishing for SNE/MA winter flounder. For example, if a sector did not have ACE for SNE/MA winter flounder, it would not be allowed to fish in the SNE/MA winter flounder stock area unless its operations plan specified how such activity could occur without catching the stock.

Both sector and common pool groundfish vessels would be allowed to land SNE/MA winter flounder. This measure would also result in a specific sub-ACL for the common pool which, if necessary, may be subject to a trip limit as established by the Regional Administrator and if caught would trigger AMs for the common pool as described by Amendment 16. Beginning with FY 2012, as described in Amendment 16, the common pool ACL for this stock would be distributed over three trimesters. If a trimester ACL would be exceeded, then common pool vessels would be subject to stock-specific area closures as implemented by Amendment 16.

An allocation would not be made between the commercial and recreational fisheries, as it was determined in Amendment 16 that federal waters catch for this stock was less than five percent of removals.

Recreational vessels would not be allowed to land SNE/MA winter flounder.

Rationale: This measure would allow fishermen to modify their behavior to control catches and would provide sampling information on a stock with very poor data. It is also not considered to be likely to increase targeting of the stock since the ACL is so low.

4.2.2 Scallop Catch of Yellowtail Flounder in GB Access Areas – Modification of Restrictions

4.2.2.1 Option 1: No Action

The scallop fishery would be subject to a maximum catch of yellowtail flounder in GB access areas (Closed Area 1, Closed Area 2, and the Nantucket Lightship Area). These TACs are equivalent to 10% of the total GB yellowtail flounder TAC (CA1 and CA2) and 10% of the total SNE/MA YT ACL (NL). This TAC has been in place since the scallop fishery was granted access into GF mortality closed areas in 1999.

4.2.2.2 Option 2: Eliminate Cap on Yellowtail Flounder Caught in the GB Access Areas (*Preferred Alternative*)

This alternative would remove the 10% cap on yellowtail flounder that can be caught in the scallop fishery access areas. The scallop fishery would still be subject to its sub-ACL of yellowtail flounder as specified in section 4.1.5, but there would not be any limits on how much of the sub-ACL could be caught in a Georges Bank access area.

Rationale: The scallop fishery is now subject to ACLs since the implementation of Amendment 15 to the Scallop FMP in 2011, and a total amount of GB yellowtail flounder that can by caught by the scallop fishery was allocated in Framework 45 to the Northeast Multispecies FMP. Because the ACLs limit the overall amount of scallops and yellowtail that can be caught, restricting the amount that can be caught in the access areas is seen to be a redundant rule that is no longer necessary to meet mortality objectives.

4.2.3 Atlantic Wolffish Landing Limit

4.2.3.1 Option 1: No Action (*Preferred Alternative*)

Landing Atlantic wolffish would continue to be prohibited.

Rationale: Landing of Atlantic wolffish was first prohibited by Amendment 16, implemented May 1, 2010.This measure would continue this prohibition in order to promote rebuilding of this stock. At least some Atlantic wolffish that are caught and discarded would be expected to survive based on studies of discard mortality from trawl vessels (Grant 2005).

4.2.3.2 Option 2: Revised Atlantic Wolffish Possession Limit

Commercial vessels would be allowed to land one Atlantic wolfish per trip. This measure would be adopted in conjunction with revised Atlantic wolffish AMs in section 4.2.5.

4.2.4 Common Pool Restricted Gear Areas

4.2.4.1 Option 1: No Action

Restricted gear areas (RGAs) adopted in Amendment 16 would remain in effect. These areas are described as follows.

Restricted Gear Areas: Two restricted gear areas would remain. Vessels fishing under a groundfish DAS are currently required to comply with the gear requirements for these areas and these provisions would remain in place if the No Action alternative is adopted.

> Administration: Vessel operators must comply with the following administrative requirements to fish in these areas:
>
> - As specified by the Regional Administrator, vessel operators must either request a Letter of Authorization (LOA) from NMFS or must make a specific VMS declaration to fish in the areas. The minimum participation period if an LOA is required is seven days.
> - A vessel can fish inside and outside the area on the same trip, but is subject to the most restrictive measures (gear, trip limits, etc.) for the entire trip.
> - Existing gear performance standards apply to gear used in these areas. Gillnets with large mesh that are allowed in the area are allowed to retain monkfish subject to monkfish possession limits and not the gear performance standards.
> - Other gear is not allowed on board when operating in these areas.
> - Additional gear (such as the five-point trawl, raised footrope trawl, or tie-down sink gillnets with mesh less than ten inches) may be considered for use in this area if approved by the Regional Administrator consistent with the regulations for approving additional gear in special management programs.
>
> Areas: The areas are defined as:
>
> Western GB Multispecies RGA:
> 42-00N 69-30W
> 42-00N 68-30W
> 41-00N 68-30W
> 41-00N 69-30W

Southern New England Multispecies RGA:

41-30N 70-30W
40-00N 70-30W
40-00N 71-30W
40-30N 71-30W
40-30N 72-00W
North to the Connecticut shoreline at 72-00W
East along the shoreline to 41-30N

Gear restrictions include:

Trawl Gear: Trawl vessels fishing under a groundfish DAS must use a haddock separator trawl, eliminator trawl, or the rope trawl. The haddock separator trawl and Ruhle trawl are described in existing regulations.

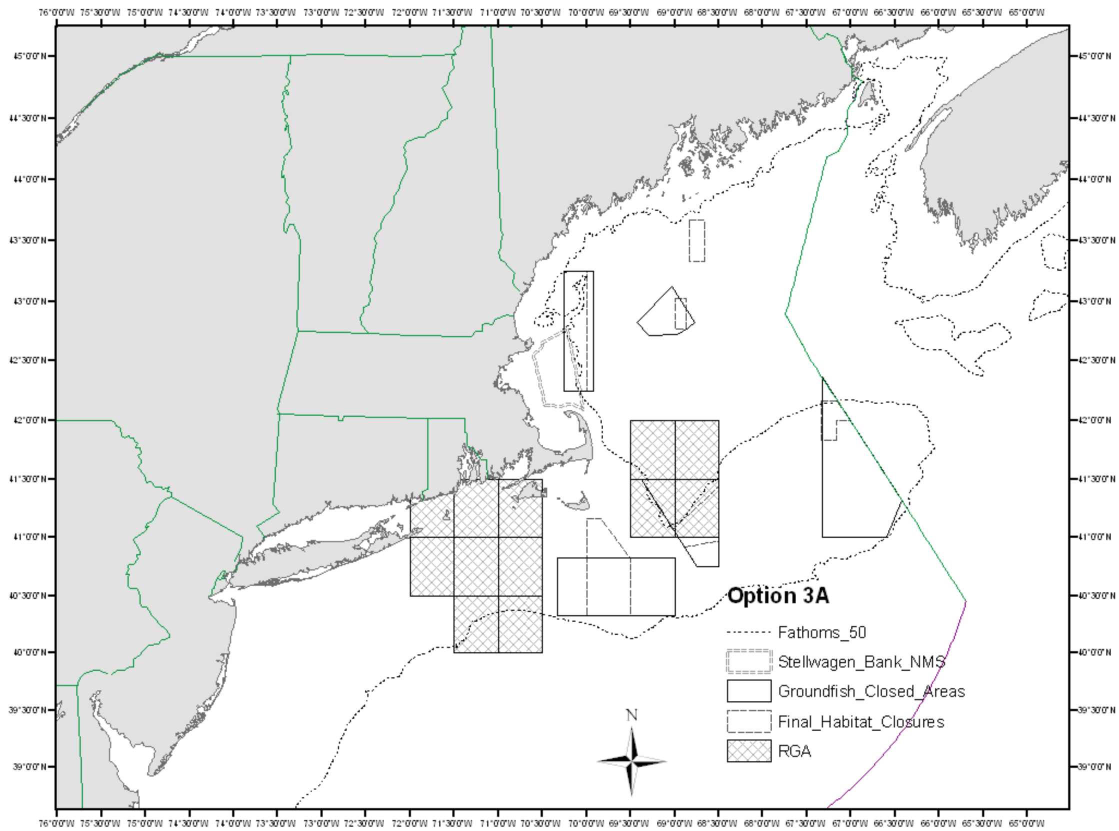
Rope trawl: The design includes a four-panel structure to increase headline height and large mesh in the front part of the trawl. The separator panel is made from a series of parallel ropes of different lengths. The panel is one-third from the fishing line in the vertical plane. There is a large escape opening in the bottom of the trawl. Additional details will be clarified by NMFS in the proposed rule and final regulations.

Sink gillnets: No tiedown nets allowed using mesh less than ten inches. Stand-up gillnets are allowed with legal size mesh.

Longline/tub trawls

Handgear

Figure 1 – Option 1 restricted gear areas



4.2.4.2 Option 2: Removal of Common Pool Restricted Gear Areas (*Preferred Alternative*)

The restricted gear areas (RGAs) for common pool vessels that were adopted in Amendment 16 would be removed. The selective gears that were authorized for these areas would remain approved for use as selective gear in other programs. These gears include the Ruhle trawl, the haddock separator trawl, the rope trawl, and other trawl gear approved for use in special management programs.

Rationale: This measure was designed to be considered as part of the AM measure changes proposed in section 4.2.5. With modifications to the AMs that may be adopted for FY 2012 the RGAs would be an unnecessary regulation. Sufficient controls exist to control fishing mortality by common pool vessels. Removing these measures would simplify the regulations, avoid possible confusion between AM areas and RGAs, and facilitate fishing by common pool vessels without risk of exceeding mortality targets.

4.2.5 Accountability Measures

Any combination of the options may be chosen for this measure.

4.2.5.1 Option 1: No Action

The AMs for Atlantic halibut, ocean pout, windowpane flounder, and Atlantic wolffish would remain as adopted by Amendment 16. The AMs for SNE/MA winter founder would remain the same unless the measure in section 4.2.1.2 is adopted in which case sector vessels would have controls on their catches of this stock. These No Action AMs measures provide that SNE/MA winter flounder and Atlantic wolffish ACLs are divided into three trimester TACs and the AM is evaluated on the basis of the catch in a trimester. If catches exceed the ACL in a trimester, fishing activity by common pool vessels would be constrained.

For Atlantic wolffish and SNE/MA winter flounder, if the catch exceeds 90 percent of the trimester TAC, the area that accounts for 90 percent of the catch would be closed to common pool fishing by certain gears. The areas and gears are shown in Table 13.

Table 13 – Gears prohibited in specific areas when a TAC/ACL is caught.

SPECIES	STOCK	Area/Gear Prohibited When TAC/ACL is Caught	
		Statistical Areas	Gear
Winter Flounder	SNE/MA	521,526,537,539,612,613	Trawl
Atlantic Wolffish		513,514,521,522	Gillnet, trawl, longline

For ocean pout, windowpane flounders, and Atlantic halibut, at the point that 60 percent of the ACL is harvested possession limits are adjusted to prevent the ACL from being exceeded.

This No Action option is applicable to all other options in this section.

4.2.5.2 Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish (*Preferred Alternative for Ocean Pout and Windowpane Flounder Only*)

These AMs are designed to apply to groundfish fishing activity by both common pool and sector groundfish fishing vessels. Since the design of these AMs is based on constraining all groundfish fishing activity, sectors will not be able to request an exemption from the AM provisions.

Timing: There are two options on the timing of this AM.

Sub-Option A: An overage in year 1 would lead to implementation of the AM in year 2. In order to implement this AM by the start of the fishing year, NMFS may have to make assumptions on the catch of ACL sub-components because of a lack of data. When final results are available, changes to the AM may be announced if the final estimates differ from the original estimate.

Sub-Option B (*Preferred Alternative*): Catches in year 1 would be evaluated in year 2. If there is an overage in year 1, the AM would be implemented in year 3.

Windowpane Flounder and Ocean Pout

The groundfish fishery AM for ocean pout would be implemented if the total ACL (as opposed to the groundfish sub-ACL) is projected to be exceeded. Should a sub-ACL be allocated to other fisheries and AMs developed for those fisheries, the AMs for either (or both) fisheries will be implemented only if the total ACL for the stock is exceeded. If only one fishery exceeds its sub-ACL the AM will be implemented only for that fishery. Note that for both stocks, a specific area-based measure becomes effective only if catches exceed the ACL by more than the allowance for management uncertainty. In effect, the area-based measures are effective if the ABC is exceeded.

The groundfish fishery AM for windowpane flounder will be implemented if the total ACL (as opposed to the groundfish sub-ACL) is exceeded. Should a sub-ACL be allocated to another fishery and AMs developed for that fishery, the AMs for both fisheries will be implemented only if the total ACL for the stock is exceeded.

If the AM is implemented trawl vessels would be required to use approved selective trawl gear that reduces the catch of demersal species. Approved gears include the separator trawl, Ruhle trawl, mini-Ruhle trawl, rope trawl, and other gear authorized by the Council in a management action or approved for use consistent with the process defined in 50 CFR 648.85 (b)(6). There would be no restrictions on longline or gillnet gear.

Areas: The applicable areas where gear restrictions would apply are shown in Figure 2. The areas are designed to be stock specific – the areas on GB are implemented only if the ACL for northern windowpane flounder is exceeded; the areas in SNE are implemented only if the southern windowpane flounder ACL is exceeded. Both areas would be implemented if the ACL for ocean pout is exceeded. The size of the areas for the restrictions is based on the amount of the overage. In each case the smaller area is implemented for ACL overages that are between the management uncertainty buffer and up to 20 percent; both the smaller and larger areas area implemented for overages of more than 20 percent.

Northern Windowpane Flounder AM area – Small

41-10N 67-40W
41-10N 67-20W
41-00N 67-20W
41-00N 67-00W
40-50N 67-00W
40-50N 67-40W

Northern Windowpane Flounder AM area – Large

42-10N 67-40W
42-10N 67-20W

41-00N 67-20W
41-00N 67-00W
40-50N 67-00W
40-50N 67-40W

Southern Windowpane Flounder Area – Small

41-10N 71-30W
41-10N 71-20W
40-50N 71-20W
50-50N 71-30W

Southern Windowpane Flounder Area - Large

41-10N 71-50W
41-10N 71-10W
41-00N 71-10W
41-00N 71-20W
40-50N 71-20W
40-50N 71-50W

And

NY coast at 73-30W
40-30N 73-30W
40-30N 73-50W
40-20N 73-50W
NJ coast at 73-50W
North along 73-50W to NY coast

Figure 2 - AM areas (small) for Northern and Southern Windowpane and Ocean Pout

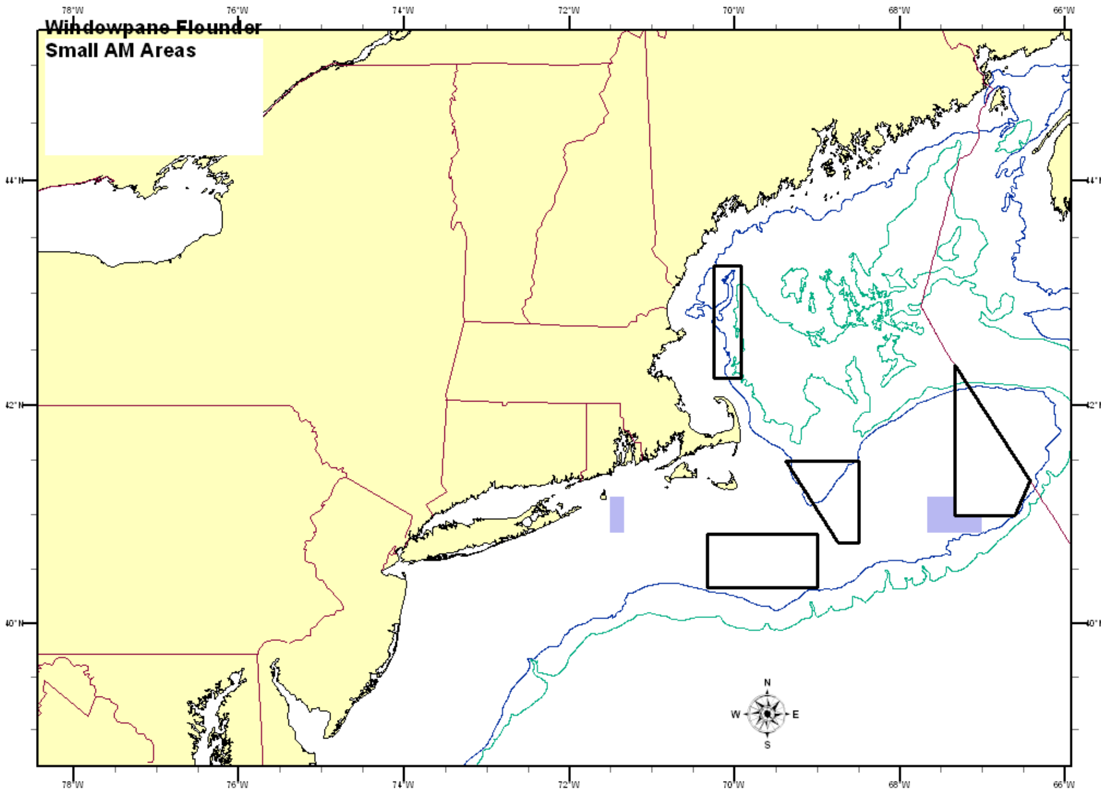
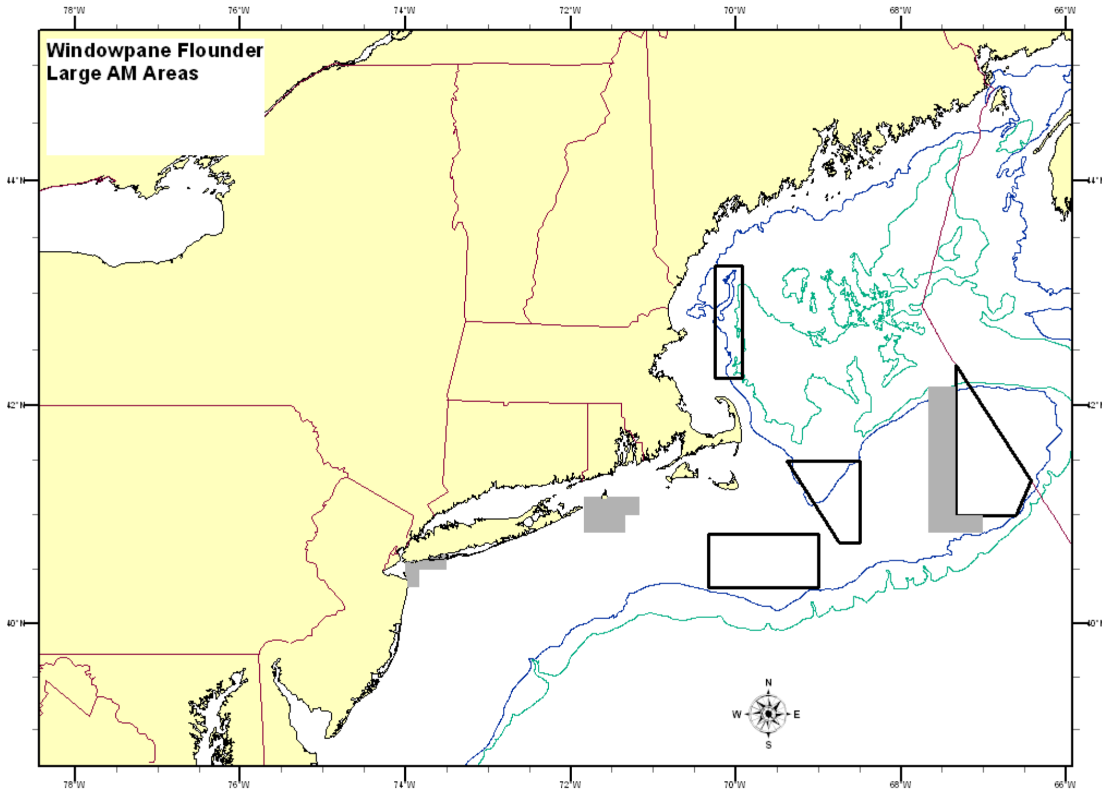


Figure 3 – AM area (large) for windowpane flounder and ocean pout



Atlantic halibut

The groundfish fishery AM for Atlantic halibut would be implemented if the total ACL (as opposed to the groundfish sub-ACL) is projected to be exceeded. Should a sub-ACL be allocated to other fisheries and AMs developed for those fisheries, the AMs for either (or both) fisheries will be implemented only if the total ACL for the stock is exceeded. If only one fishery exceeds its sub-ACL the AM will be implemented only for that fishery. Note that for this stock a specific area-based measure becomes effective only if catches exceed the ACL by more than the allowance for management uncertainty. In effect, the area-based measures are effective if the ABC is exceeded.

If the AM is implemented trawl vessels would be required to use approved selective trawl gear that reduces the catch of flounders and retention of Atlantic halibut would be prohibited. Approved gears include the separator trawl, Ruhle trawl, mini-Ruhle trawl, rope trawl, and other gear authorized by the Council in a management action or approved for use consistent with the process defined in 50 CFR 648.85 (b)(6).

If the AM is implemented, sink gillnet and longline vessels would not be allowed to fish in the AM areas described below. Should selective gear be developed that reduces catches of these species then fishing would be allowed in these areas as long as the gear is used. Such gear must be approved through the process used to authorize selective trawl gear before it is authorized for use.

Areas: The areas are designed to account for an ACL overage of up to 20 percent. The areas would be implemented for ACL overages that are between the management uncertainty buffer and 20 percent.

The applicable areas where trawl gear restrictions would apply are shown in Figure 4.

The areas where sink gillnet and longline fishing would be prohibited (or if selective gear is developed, where use of the gear would be required) are also shown in Figure 4.

Trawl Gear Halibut AM Area

42-00N 69-20W
42-00N 68-20W
41-30N 68-20W
41-30N 69-20W

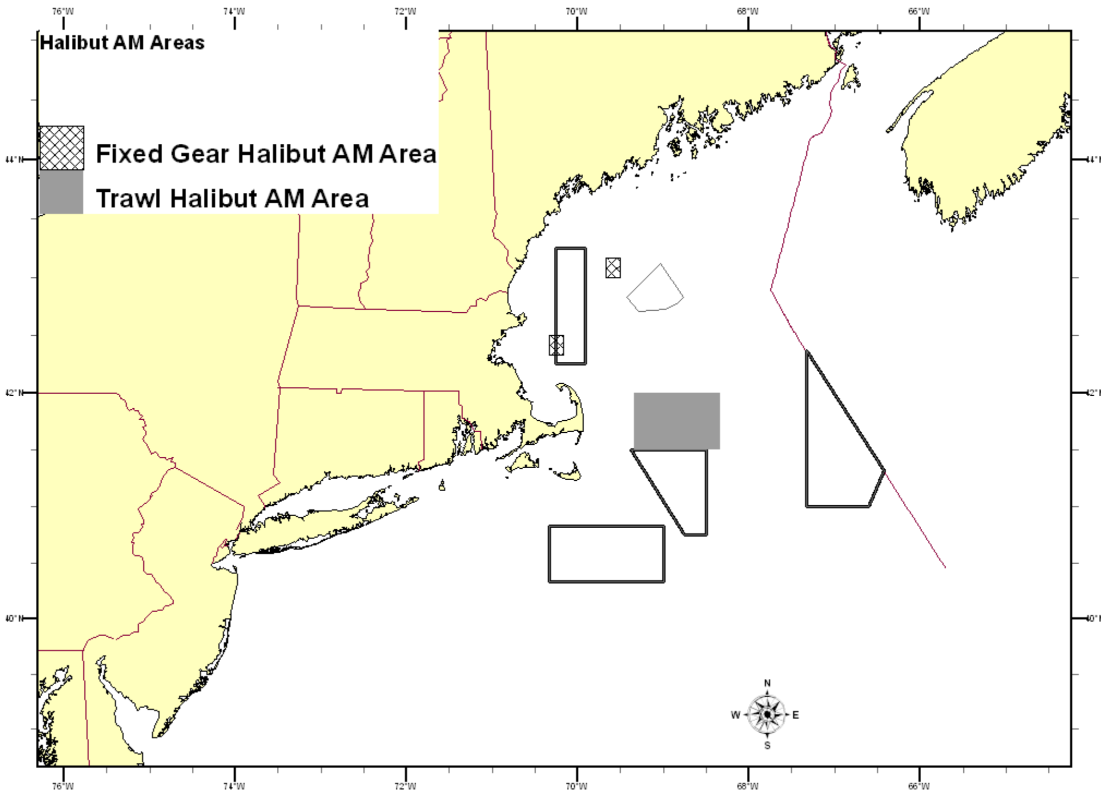
Fixed Gear Halibut AM areas

41-40N 69-40W
41-40N 69-30W
41-30N 69-30W
41-30N 69-40W

And

43-10N 69-40W
43-10N 69-30W
43-00N 69-30W
43-00N 69-40W

Figure 4 – Proposed AM areas for fixed gear and trawl vessels for halibut.



Atlantic Wolffish

The groundfish fishery AM for Atlantic wolffish would be implemented if the total ACL (as opposed to the groundfish sub-ACL) is projected to be exceeded. Should a sub-ACL be allocated to other fisheries and AMs developed for those fisheries, the AMs for either (or both) fisheries will be implemented only if the total ACL for the stock is exceeded. If only one fishery exceeds its sub-ACL the AM will be implemented only for that fishery. Note that for this stock a specific area-based measure becomes effective only if catches exceed the ACL by more than the allowance for management uncertainty. In effect, the area-based measures are effective if the ABC is exceeded.

If the AM is implemented trawl vessels would be required to use approved selective trawl gear that reduces the catch of demersal species. Approved gears include the separator trawl, Ruhle trawl, mini-Ruhle trawl, rope trawl, and other gear authorized by the Council in a management action or approved for use consistent with the process defined in 50 CFR 648.85 (b)(6).

If the AM is implemented, sink gillnet and longline vessels would not be allowed to fish in the AM areas described below. Should selective gear be developed that reduces catches of these species then fishing would be allowed in these areas as long as the gear is used. Such gear must be approved through the process used to authorize selective trawl gear before it is authorized for use.

The AM measures would be in effect from May through December, and in April. The measures would not be in effect from January through March because the habits of wolffish make it less susceptible to fishing at that time.

Areas: The areas are designed to account for an AM overage of up to 20 percent. The areas would be implemented for ACL overages that are between the management uncertainty buffer and 20 percent.

The applicable areas where trawl gear restrictions would apply are shown in Figure 5.

The areas where sink gillnet and longline fishing would be prohibited (or if selective gear is developed, where use of the gear would be required) are shown in Figure 5.

Trawl Wolffish AM Area

42-30N 70-30W
42-30N 70-15W
42-15N 70-15W
42-15N 70-10W
42-10N 70-10W
42-10N 70-20W
42-20N 70-20W
42-20N 70-30W

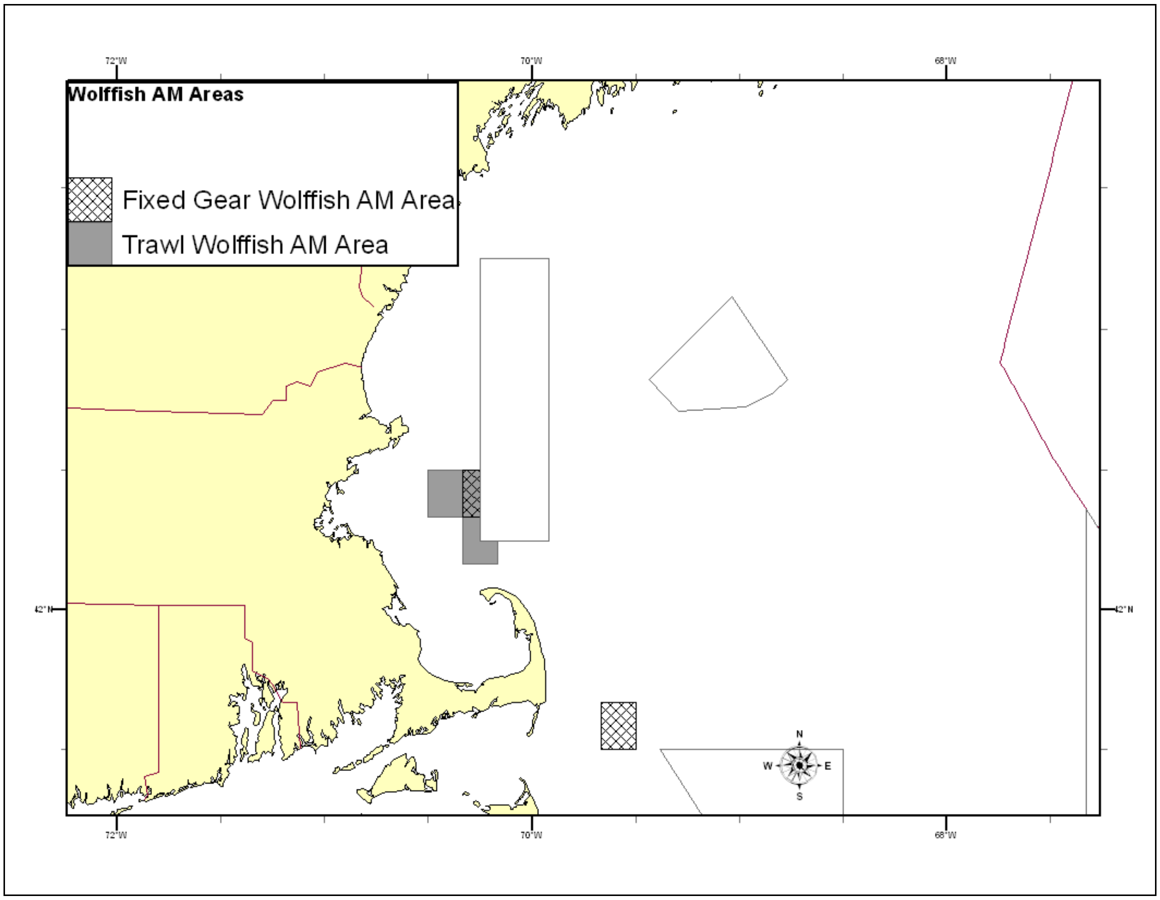
Fixed Gear Wolffish AM Area

41-40N 69-40W
41-40N 69-30W
41-30N 69-30W
41-30N 69-40W

And

42-30N 70-20W
42-30N 70-15W
42-20N 70-15W
42-20N 70-20W

Figure 5 – Proposed AM areas for fixed gear and trawl gear for wolffish. Note the AM areas overlap on the western side of the WWGOM closed area.



4.2.5.3 Option 3: Atlantic Halibut No Possession AM (*Preferred Alternative*)

If the Atlantic halibut AM is exceeded, the landing of Atlantic halibut both commercial fishing vessels would be prohibited. All halibut that are caught must be returned alive to the sea.

Timing: There are two options on the timing of this AM.

Sub-Option A: An overage in year 1 would lead to implementation of the AM in year 2. In order to implement this AM by the start of the fishing year, NMFS may have to make assumptions on the catch of ACL sub-components because of a lack of data. When final results are available, changes to the AM may be announced if the final estimates differ from the original estimate.

Sub-Option B (*Preferred Alternative*): Catches in year 1 would be evaluated in year 2. If there is an overage in year 1, the AM would be implemented in year 3.

Rationale: This AM, if adopted and implemented, would be expected to keep mortality of halibut below targeted levels. Halibut are a hardy fish and even if caught and discarded a portion would be expected to survive. The timing of the AM would allow a more thorough evaluation of catch before the AM was adopted, an important consideration since some of the catch is from state waters and in-season data may not be available.

4.2.5.4 Option 4: Atlantic Wolffish – No Possession AM (*Preferred Alternative*)

Possession of Atlantic wolffish would be prohibited. This proactive AM would apply for both commercial and recreational vessels.

Rationale: This measure would adopt the prohibition on landing Atlantic wolffish as a proactive AM for that stock.

4.2.5.5 Option 5: SNE/MA Winter Flounder No Possession AM (*Preferred Alternative*)

Possession of SNE/MA winter flounder would be prohibited, and this prohibition is considered a proactive AM. This measure replaces the No Action AM for SNE/MA winter flounder.

Rationale: This measure would adopt the prohibition on landing Atlantic wolffish as a proactive AM for that stock.

5.0 Alternatives Considered and Rejected

5.1.1 Identification of Additional Sub-Annual Catch Limits

Amendment 16 identified how the ABC is distributed to various components of the fishery. The identified components include sub-ACLs as well as other identified sub-components. In general, sub-ACLs are specified when the catch by a component of the fishery is large enough that controls are needed to make certain that the overall ACL will not be exceeded. Accountability measures are identified for sub-ACLs, either in the Northeast Multispecies FMP or in another FMP. Other identified sub-components are used for smaller catches that are determined unlikely to need a specific control. AMs on other parts of the fishery must be sufficient to account for any overages of the other sub-components.

The Council considered several additional sub-ACLs:

- A sub-ACL of SNE/MAB windowpane flounder for the scallop fishery
- A sub-ACL of SNE/MAB windowpane flounder for other fishery components that catch the stock
- A sub-ACL of SNE/MA winter flounder for the scallop fishery

These sub-ACLs were not pursued because of difficulties encountered in estimating recent catches for these stocks. The Council may consider these sub-ACLs in a future action.

5.1.2 Mixed Stock Exception for SNE/MAB Windowpane Flounder

The Groundfish Committee discussed applying the Mixed Stock Exception for SNE/MAB windowpane flounder. This measure was not pursued because analyzing the options may have prevented timely completion of the framework.

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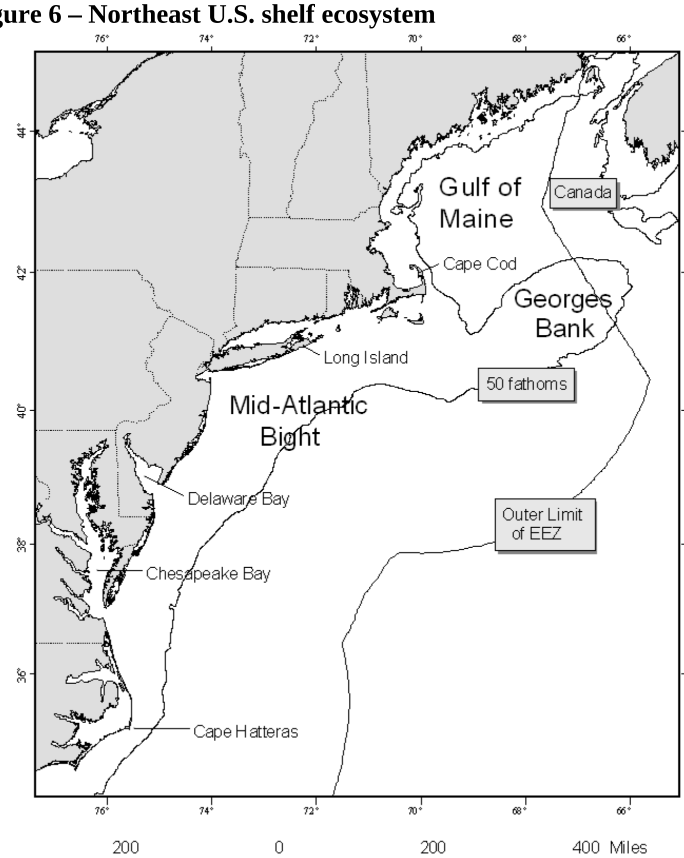
6.0 Affected Environment

The Valued Ecosystem Components (VECs) affected by the Preferred Alternatives include the physical environment, Essential Fish Habitat (EFH), target species, non-target species/bycatch, protected resources, and human communities, which are described below.

6.1 Physical Environment/Habitat/EFH

The Northeast U.S. Shelf Ecosystem (Figure 6) has been described as including the area from the Gulf of Maine south to Cape Hatteras, North Carolina, extending from the coast seaward to the edge of the continental shelf, including offshore to the Gulf Stream (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 2,000 meters (m). Four distinct sub-regions comprise the NOAA Fisheries Northeast Region: the Gulf of Maine, Georges Bank, the southern New England/Mid-Atlantic region, and the continental slope. Since the groundfish fleet will primarily be fishing in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic areas, the description of the physical and biological environment is focused on these sub-regions. Information on the affected environment was extracted from Stevenson et al. (2004).

Figure 6 – Northeast U.S. shelf ecosystem

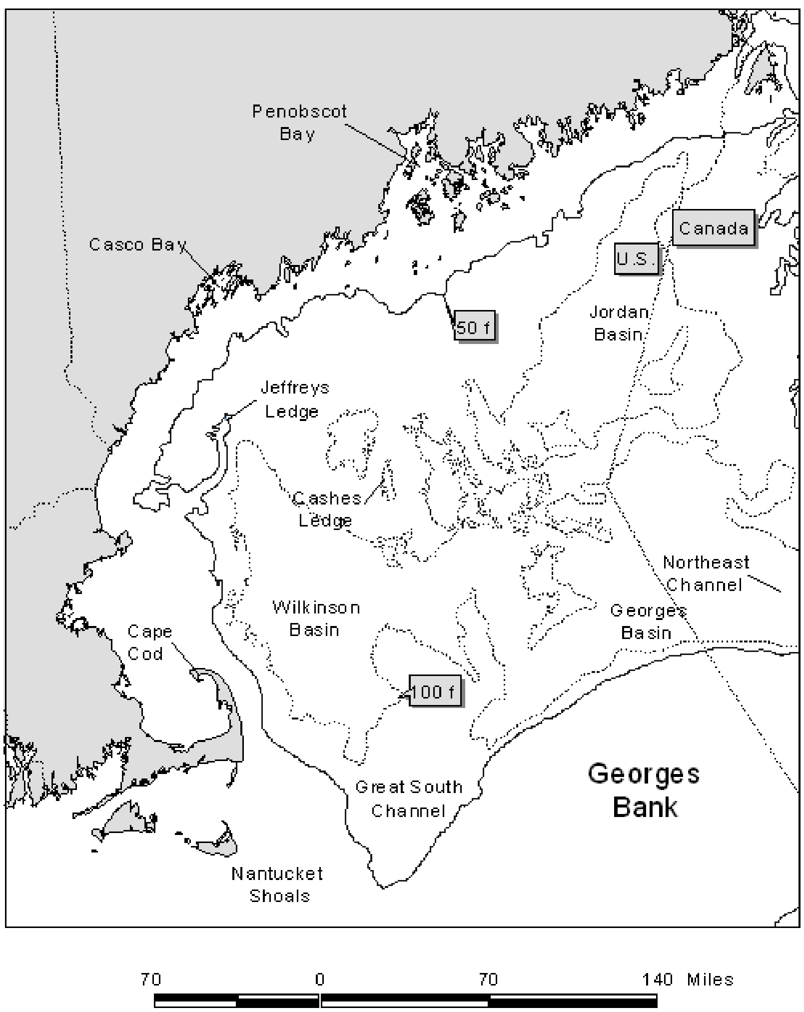


6.1.1 Affected Physical Environment

6.1.1.1 Gulf of Maine

The Gulf of Maine is an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Figure 6). The Gulf of Maine is a boreal environment and is characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 9 m below the surface.

Figure 7 – Gulf of Maine



The Gulf of Maine is an enclosed coastal sea that was glacially derived and is characterized by a system of deep basins, moraines, and rocky protrusions (Stevenson et al. 2004). The Gulf of

Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast (Stevenson et al. 2004). Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[1] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a depth of about 60 m. Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 20 to 40 m, except off eastern Maine where a gravel-covered plain exists to depths of at least 100 m. Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches.

The geologic features of the Gulf of Maine coupled with the vertical variation in water properties (e.g. salinity, depth, temperature) combine to provide a great diversity of habitat types that support a rich biological community. To illustrate this, a brief description of benthic invertebrates and demersal (i.e., bottom-dwelling) fish that occupy the Gulf of Maine is provided below. Additional information is provided in Stevenson et al. (2004), which is incorporated by reference.

The most common groups of benthic invertebrates in the Gulf of Maine reported by Theroux and Wigley (1998) in terms of numbers collected were annelid worms, bivalve mollusks, and amphipod crustaceans. Biomass was dominated by bivalves, sea cucumbers, sand dollars, annelids, and sea anemones. Watling (1998) identified seven different bottom assemblages that occur on the following habitat types:

Sandy offshore banks: fauna are characteristically sand dwellers with an abundant interstitial component;

Rocky offshore ledges: fauna are predominantly sponges, tunicates, bryozoans, hydroids, and other hard bottom dwellers;

Shallow (< 60 m) temperate bottoms with mixed substrate: fauna population is rich and diverse, primarily comprised of polychaetes and crustaceans;

Primarily fine muds at depths of 60 to 140 m within cold Gulf of Maine Intermediate Water[2]: fauna are dominated by polychaetes, shrimp, and cerianthid anemones;

Cold deep water, muddy bottom: fauna include species with wide temperature tolerances which are sparsely distributed, diversity low, dominated by a few polychaetes, with brittle stars, sea pens, shrimp, and cerianthids also present;

[1] The term “gravel,” as used in this analysis, is a collective term that includes granules, pebbles, cobbles, and boulders in order of increasing size. Therefore, the term “gravel” refers to particles larger than sand and generally denotes a variety of “hard bottom” substrates.

[2] Maine Intermediate Water is described as a mid-depth layer of water that preserves winter salinity and temperatures, and is located between more saline Maine bottom water and the warmer, stratified Maine surface water. The stratified surface layer is most pronounced in the deep portions of the western Gulf of Maine.

Deep basin, muddy bottom, overlaying water usually 7 to 8°C: fauna densities are not high, dominated by brittle stars and sea pens, and sporadically by a tube-making amphipods; and

Upper slope, mixed sediment of either fine muds or mixture of mud and gravel, water temperatures always greater than 8°C: upper slope fauna extending into the Northeast Channel.

Two studies (Gabriel 1992, Overholtz and Tyler 1985) reported common[3] demersal fish species by assemblages in the Gulf of Maine and Georges Bank:

Deepwater/Slope and Canyon: offshore hake, blackbelly rosefish, Gulf stream flounder;

Intermediate/Combination of Deepwater Gulf of Maine-Georges Bank and Gulf of Maine-Georges Bank Transition: silver hake, red hake, goosefish (monkfish);

Shallow/Gulf of Maine-Georges Bank Transition Zone: Atlantic Cod, haddock, pollock;

Shallow water Georges Bank-southern New England: yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin;

Deepwater Gulf of Maine-Georges Bank: white hake, American plaice, witch flounder, thorny skate; and

Northeast Peak/Gulf of Maine-Georges Bank Transition: Atlantic cod, haddock, pollock.

6.1.1.2 Georges Bank

Georges Bank is a shallow (3 to 150 m depth), elongate (161 km wide by 322 km long) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Figure 6). It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank and has steep submarine canyons on its eastern and southeastern edges. It is characterized by highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents reduces the amount of sand and cause an overall coarsening of the bottom sediments (Valentine and Lough 1991).

Bottom topography on eastern Georges Bank is characterized by linear ridges in the western shoal areas; a relatively smooth, gently dipping seafloor on the deeper, easternmost part; a highly energetic peak in the north with sand ridges up to 30 m high and extensive gravel pavement; and steeper and smoother topography incised by submarine canyons on the southeastern margin. The central region of Georges Bank is shallow, and the bottom is characterized by shoals and troughs, with sand dunes superimposed within. The area west of the Great South Channel, known as Nantucket Shoals, is similar in nature to the central region of Georges Bank. Currents in these areas are strongest where water depth is shallower than 50 m. Sediments in this region include

[3] Other species were listed as found in these assemblages, but only the species common to both studies are listed.

gravel pavement and mounds, some scattered boulders, sand with storm-generated ripples, and scattered shell and mussel beds. Tidal and storm currents range from moderate to strong, depending upon location and storm activity.

Oceanographic frontal systems separate water masses of the Gulf of Maine and Georges Bank from oceanic waters south of Georges Bank. These water masses differ in temperature, salinity, nutrient concentration, and planktonic communities, which influence productivity and may influence fish abundance and distribution.

Georges Bank has been historically characterized by high levels of both primary productivity and fish production. The most common groups of benthic invertebrates on Georges Bank in terms of numbers collected were amphipod crustaceans and annelid worms, and overall biomass was dominated by sand dollars and bivalves (Theroux and Wigley 1998). Using the same database, four macrobenthic invertebrate assemblages that occur on similar habitat type were identified (Theroux and Grosslein 1987):

The Western Basin assemblage is found in comparatively deepwater (150 to 200 m) with relatively slow currents and fine bottom sediments of silt, clay, and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers.

The Northeast Peak assemblage is found in variable depth and current strength and includes coarse sediments, consisting mainly of gravel and coarse sand with interspersed boulders, cobbles, and pebbles. Fauna tend to be sessile (coelenterates, brachiopods, barnacles, and tubiferous annelids) or free-living (brittle stars, crustaceans, and polychaetes), with a characteristic absence of burrowing forms.

The Central Georges Bank assemblage occupies the greatest area, including the central and northern portions of Georges Bank in depths less than 100 m. Medium-grained shifting sands predominate this dynamic area of strong currents. Organisms tend to be small to moderately large with burrowing or motile habits. Sand dollars are most characteristic of this assemblage.

The Southern Georges Bank assemblage is found on the southern and southwestern flanks at depths from 80 to 200 m, where fine-grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range. Dominant fauna include amphipods, copepods, euphausiids, and starfish.

Common demersal fish species in Georges Bank are offshore hake, blackbelly rosefish, Gulf Stream flounder, silver hake, red hake, goosefish (monkfish), Atlantic cod, haddock, pollock, yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin, white hake, American plaice, witch flounder, and thorny skate.

6.1.1.3 Southern New England/Mid-Atlantic Bight

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream (Figure 6). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England and generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern

New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 to 200 m water depth) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson et al. 2004). Like the rest of the continental shelf, the topography of the Mid-Atlantic Bight was shaped largely by sea level fluctuations during past ice ages. Since that time, currents and waves have modified this basic structure.

The sediment type covering most of the shelf in the Mid-Atlantic Bight is sand, with some relatively small, localized areas of sand-shell and sand-gravel. On the slope, silty sand, silt, and clay predominate. Permanent sand ridges occur in groups with heights of about 10 m, lengths of 10 to 50 km and spacing of 2 km. The sand ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Sand waves are usually found in patches of 5 to 10 with heights of about 2 m, lengths of 50 to 100 m, and 1 to 2 km between patches. The sand waves are usually found on the inner shelf and are temporary features that form and re-form in different locations, especially in areas like Nantucket Shoals where there are strong bottom currents. Because tidal currents southwest of Nantucket Shoals and southeast of Long Island and Rhode Island slow significantly, there is a large mud patch on the seafloor where silts and clays settle out.

Artificial reefs are another significant Mid-Atlantic Bight habitat, formed much more recently on the geologic time scale than other regional habitat types. These localized areas of hard structure have been formed by shipwrecks, lost cargoes, disposed solid materials, shoreline jetties and groins, submerged pipelines, cables, and other materials (Steimle and Zetlin 2000). In general, reefs are important for attachment sites, shelter, and food for many species. In addition, fish predators, such as tunas, may be attracted by prey aggregations or may be behaviorally attracted to the reef structure. Estuarine reefs, such as blue mussel beds or oyster reefs, are dominated by epibenthic organisms, as well as crabs, lobsters, and sea stars. These reefs are hosts to a multitude of fish, including gobies, spot, bass (black sea and striped), perch, toadfish, and croaker. Coastal reefs are comprised of either exposed rock, wrecks, kelp, or other hard material, and these are generally dominated by boring mollusks, algae, sponges, anemones, hydroids, and coral. These reef types also host lobsters, crabs, sea stars, and urchins, as well as a multitude of fish, including black sea bass, pinfish, scup, cunner, red hake, gray triggerfish, black grouper, smooth dogfish, and summer flounder. These epibenthic organisms and fish assemblages are similar to the reefs farther offshore, which are generally comprised of rocks and boulders, wrecks, and other types of artificial reefs. There is less information available for reefs on the outer shelf, but the fish species associated with these reefs include tilefish, white hake, and conger eel.

The benthic inhabitants of this primarily sandy environment are dominated in terms of numbers by amphipod crustaceans and bivalve mollusks. Biomass is dominated by mollusks (70 percent) (Theroux and Wigley 1998). Pratt (1973) identified three broad faunal zones related to water depth and sediment type:

> The “sand fauna” zone is dominated by polycheates and was defined for sandy sediments (1 percent or less silt) that are at least occasionally disturbed by waves, from shore out to a depth of about 50 m.

The “silty sand fauna” zone is dominated by amphipods and polychaetes and occurs immediately offshore from the sand fauna zone, in stable sands containing a small amount of silt and organic material.

Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley supporting the “silt-clay fauna.”

Rather than substrate as in the Gulf of Maine and Georges Bank, latitude and water depth are considered to be the primary factors influencing demersal fish species distribution in the Mid-Atlantic Bight area. The following assemblages were identified by Colvocoresses and Musick (1984) in the Mid-Atlantic subregion during spring and fall.[4]

Northern (boreal) portions: hake (white, silver, red), goosefish (monkfish), longhorn sculpin, winter flounder, little skate, and spiny dogfish;

Warm temperate portions: black sea bass, summer flounder, butterfish, scup, spotted hake, and northern searobin;

Water of the inner shelf: windowpane flounder;

Water of the outer shelf: fourspot flounder; and

Water of the continental slope: shortnose greeneye, offshore hake, blackbelly rosefish, and white hake.

6.1.2 Habitat

Habitats provide living things with the basic life requirements of nourishment and shelter, ultimately providing for both individual and population growth. The fishery resources of a region are influenced by the quantity and quality of available habitat. Depth, temperature, substrate, circulation, salinity, light, dissolved oxygen, and nutrient supply are important parameters of a given habitat which, in turn, determine the type and level of resource population that the habitat supports. Table 14 briefly summarizes the habitat requirements for each of the 12 groundfish species managed by the Northeast Multispecies (large-mesh) FMP, some of which consist of multiple stocks within the Northeast Multispecies FMP. Information for this table was extracted from the original FMP and profiles available from NMFS (Clark 1998). Essential fish habitat information for egg, juvenile and adult life stages for these species was compiled from Stevenson et al. 2004 (Table 14). Note that EFH for the egg stage was included for species that have a demersal egg stage (winter flounder and ocean pout); all other species’ eggs are found either in the surface waters, throughout the water column, or are retained inside the parent until larvae hatch. The egg habitats of these species are therefore not generally subject to interaction with gear and are not listed in Table 14.

[4] Other species were listed as found in these assemblages, but only the species common to both spring and fall seasons are listed.

Table 14 - Summary of geographic distribution, food sources, essential fish habitat features, and commercial gear used to catch each species in the Northeast Multispecies Fishery Management Unit

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat		Commercial Fishing Gear Used
			Water Depth	Substrate	
Atlantic cod	Gulf of Maine, Georges Bank and southward	Omnivorous (invertebrates and fish)	(J): 25-75 m (82-245 ft) (A): 10-150 m (33-492 ft)	(J): Cobble or gravel bottom substrates (A): Rocks, pebbles, or gravel bottom substrate	Otter trawl, longlines, gillnets
Haddock	southwestern Gulf of Maine and shallow waters of Georges Bank	Benthic feeders (amphipods, polychaetes, echinoderms), bivalves, and some fish	(J): 35-100 m (115– 28 ft) (A): 40-150 m (131-492 ft)	(J): Pebble and gravel bottom substrates (A): Broken ground, pebbles, smooth hard sand, smooth areas between rocky patches	Otter trawl, longlines, gillnets
Acadian redfish	Gulf of Maine, deep portions of Georges Bank and Great South Channel	Crustaceans	(J): 25-400 m (82-1,312 ft) (A): 50-350 m (164–1,148 ft)	(J): Bottom habitats with a substrate of silt, mud, or hard bottom (A): Same as for (J)	Otter trawl
Pollock	Gulf of Maine, extends to Georges Bank, and the northern part of Mid-Atlantic Bight	Juvenile feed on crustaceans, adults also feed on fish and mollusks	(J): 0-250 m (0-820 ft) (A): 15-365 m (49-1,198 ft)	(J): Bottom habitats with aquatic vegetation or substrate of sand, mud, or rocks (A): Hard bottom habitats including artificial reefs	Otter trawl, gillnets

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat: Water Depth	Essential Fish Habitat: Substrate	Commercial Fishing Gear Used
Ocean Pout	Gulf of Maine, Cape Cod Bay, Georges Bank, southern New England, middle Atlantic south to Delaware Bay	Juveniles feed on amphipods and polychaetes. Adults feed mostly on echinoderms as well as on mollusks and crustaceans	(E): <50 m (<164 ft)	(E): Bottom habitats, generally hard bottom sheltered nests, holes, or crevices where juveniles are guarded.	Otter trawl
			(L): <50 m (<164 ft)	(L): Hard bottom nesting areas	
			(J): <80 m (262 ft)	(J): Bottom habitat, often smooth areas near rocks or algae	
			(A): <110 m (361 ft)	(A): Bottom habitats; dig depressions in soft sediments	
Atlantic Halibut	Gulf of Maine, Georges Bank	Juveniles feed on annelid worms and crustaceans, adults mostly feed on fish	(J): 20-60 m (66-197 ft)	(J): Bottom habitat with a substrate of sand, gravel, or clay	Otter trawl, longlines
			(A):100-700 m (328-2,297 ft)	(A): Same as for (J)	
White hake	Gulf of Maine, Georges Bank, southern New England	Juveniles feed mostly on polychaetes and crustaceans; adults feed mostly on crustaceans, squids, and fish	(J): 5-225 m (16-738 ft)	(J): Bottom habitat with seagrass beds or substrate of mud or fine-grained sand	Otter trawl, gillnets
			(A): 5-325 m (16-1,066 ft)	(A): Bottom habitats with substrate of mud or fine grained sand	
Yellowtail flounder	Gulf of Maine, southern New England, Georges Bank	Amphipods and polychaetes	(J): 20-50 m (66-164 ft)	(J): Bottom habitats with substrate of sand or sand and mud	Otter trawl
			(A): 20-50 m (66-164 ft)	(A): Same as for (J)	

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat: Water Depth	Essential Fish Habitat: Substrate	Commercial Fishing Gear Used
American plaice	Gulf of Maine, Georges Bank	Polychaetes, crustaceans, mollusks, echinoderms	(J): 45-150 m (148-492 ft)	(J): Bottom habitats with fine grained sediments or a substrate of sand or gravel	Otter trawl
			(A): 45–175 m (148-574 ft)	(A): Same as for (J)	
Witch flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/southern New England	Mostly polychaetes (worms), echinoderms	(J): 50-450 m (164-1,476 ft)	(J): Bottom habitats with fine grained substrate	Otter trawl
			(A): 25-300 m (82-984 ft)	(A): Same as for (J)	
Winter flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/southern New England	Polychaetes, crustaceans	(E): <5 m (16 ft)	(E): Bottom habitats with a substrate of sand, muddy sand, mud, and gravel	Otter trawl, gillnets
			(J): 0.1-10 m (0.3-32 ft) (1-50 m age 1+) (3.2-164 ft)	(J): Bottom habitats with a substrate of mud or fine grained sand	
			(A): 1-100 m (3.2-328 ft)	(A): Bottom habitats including estuaries with substrates of mud, sand, gravel	
Atlantic wolffish Proposed in Amendment 16	Gulf of Maine & Georges Bank	Mollusks, brittle stars, crabs, and sea urchins	(J): 40-240 m (131.2-787.4 ft)	J): Rocky bottom and coarse sediments	Otter trawl, longlines, and gillnets
			(A): 40-240 m (131.2-787.4 ft)	(A): Same as for (J)	
Windowpane flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/southern New England	Juveniles mostly crustaceans; adults feed on crustaceans and fish	(J): 1-100 m (3.2-328 ft)	(J): Bottom habitats with substrate of mud or fine grained sand	Otter trawl
			(A): 1-75 m (3.2-574 ft)	(A): Same as for (J)	

Note: Species life stages are summarized by letter in parentheses following species name. A = adult; E = egg; J = juvenile; m = meter.

6.1.3 Essential Fish Habitat (EFH)

EFH is defined by the Sustainable Fisheries Act of 1996 as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The environment that could potentially be affected by the Preferred Alternatives has been identified as EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; Atlantic sea scallop; monkfish; deep-sea red crab; northeast skate complex; Atlantic herring; summer flounder, scup, and black sea bass; tilefish; squid, Atlantic mackerel, and butterfish; Atlantic surfclam and ocean quahog FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and Federal waters throughout the Northeast U.S. Shelf Ecosystem. EFH descriptions of the general substrate or bottom types for all the benthic life stages of the species managed under these FMPs are summarized in Table 14. Full descriptions and maps of EFH for each species and life stage (except Atlantic wolffish) are available on the NMFS Northeast Region website at http://www.nero.noaa.gov/hcd/index2a.htm. In general, EFH for species and life stages that rely on the seafloor for shelter (e.g., from predators), reproduction, or food is vulnerable to disturbance by bottom tending gear. The most vulnerable habitat is more likely to be hard or rough bottom with attached epifauna.

6.1.4 Gear Types and Interaction with Habitat

The groundfish fleet fishes for target species with a number of gear types: trawl, gillnet, and hook and line gear (including jigs, handline, and non-automated demersal longlines). This section discusses the characteristics of each of the gear types as well as the typical impacts to the physical habitat associated with each of these gear types.

6.1.4.1 Gear Types

The characteristics of typical gear types used by the multispecies fishery are summarized in Table 15.

Table 15 - Descriptions of the fixed gear types used by the multispecies fishery

Gear Type	Trawl	Sink/ Anchor Gillnets	Bottom Longlines	Hook and Line
Total Length	Varies	90 m long per net.	~450 m.	Varies
Lines	N/A	Leadline and floatline with webbing (mesh) connecting	Mainline is parachute cord. Gangions (lines from mainline to hooks) are 15 inches long, 3 to 6 inches apart, and made of shrimp twine	One to several with mechanical line fishing
Nets	Rope or large-mesh size, depends upon target Species	Monofilament, mesh size depends on the target species (groundfish nets minimum mesh size of 6.5 inches	No nets, but 12/0 circle hooks are required.	No nets, but single to multiple hooks, “umbrella rigs”
Anchoring	N/A	22 lb (9–11 kg) Danforth-style anchors are required at each end of the net string	20-24lb (9-11kg) anchors, anchored at each end, using pieces of railroad track, sash weights, or Danforth anchors, depending on currents	No anchoring, but sinkers used (stones, lead)
Frequency/ Duration of Use	Tows last for several hours	Frequency of trending changes from daily (when targeting groundfish) to semi-weekly (when targeting monkfish and skate)	Usually set for a few hours at a time	Depends upon cast/target species

6.1.4.2 Trawl Gear

Trawls are classified by their function, bag construction, or method of maintaining the mouth opening. Function may be defined by the part of the water column where the trawl operates (e.g., bottom) or by the species that it targets (Hayes 1983). Mid-water trawls are designed to catch pelagic species in the water column and do not normally contact the bottom. Bottom trawls are designed to be towed along the seafloor and to catch a variety of demersal fish and invertebrate species.

The mid-water trawl is used to capture pelagic species throughout the water column. The mouth of the net typically ranges from 110 m to 170 m and requires the use of large vessels (Sainsbury 1996). Successful mid-water trawling requires the effective use of various electronic aids to find the fish and maneuver the vessel while fishing (Sainsbury 1996). Tows typically last for several hours and catches are large. The fish are usually removed from the net while it remains in the water alongside the vessel by means of a suction pump. In some cases, the fish are removed from the net by repeatedly lifting the cod end aboard the vessel until the entire catch is in the hold.

Three general types of bottom trawl are used in the Northeast Region, but bottom otter trawls account for nearly all commercial bottom trawling activity. There is a wide range of otter trawl types used in the Northeast as a result of the diversity of fisheries and bottom types encountered in the region (NREFHSC 2002). The specific gear design used is often a result of the target species (whether found on or off the bottom) as well as the composition of the bottom (smooth versus rough and soft versus hard). A number of different types of bottom otter trawl used in the Northeast are specifically designed to catch certain species of fish, on specific bottom types, and at particular times of year. Bottom trawls are towed at a variety of speeds, but average about 5.6 km/hour (3 knots). Use of this gear in the Northeast is managed under several federal FMPs. Bottom trawling is also subject to a variety of state regulations throughout the region.

A flatfish trawl is a type of bottom otter trawl designed with a low net opening between the headrope and the footrope and more ground rigging on the sweep. This type of trawl is designed so that the sweep follows the contours of the bottom, and to get fish like flounders - that lie in contact with the seafloor - up off the bottom and into the net. It is used on smooth mud and sand bottoms. A high-rise or fly net with larger mesh has a wide net opening and is used to catch demersal fish that rise higher off the bottom than flatfish (NREFHSC 2002).

Bottom otter trawls that are used on "hard" bottom (i.e., gravel or rocky bottom), or mud or sand bottom with occasional boulders, are rigged with rockhopper gear. The purpose of the "ground gear" in this case is to get the sweep over irregularities in the bottom without damaging the net. The purpose of the sweep in trawls rigged for fishing on smooth bottoms is to herd fish into the path of the net (Mirarchi 1998).

The raised-footrope trawl was designed to provide vessels with a means of continuing to fish for small-mesh species without catching groundfish. Raised-footrope trawls fish about 0.5 to 0.6 m above the bottom (Carr and Milliken 1998). Although the doors of the trawl still ride on the bottom, underwater video and observations in flume tanks have confirmed that the sweep in the raised-footrope trawl has much less contact with the seafloor than the traditional cookie sweep that it replaces (Carr and Milliken 1998).

6.1.4.3 Gillnet Gear

The fishery also uses individual sink/anchor gillnets which are about 90 m long and are usually fished as a series of 5 to 15 nets attached end-to-end. A vast majority of “strings” consist of 10 gillnets. Gillnets typically have three components: the leadline, webbing and floatline. In New England, leadlines are approximately 30 kilogram (kg)/net. Webs are monofilament, with the mesh size depending on the species of interest. Nets are anchored at each end using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. For New England groundfish, frequency of tending ranges from daily to semiweekly (NREFHSC 2002).

A bottom gillnet is a large wall of netting equipped with floats at the top and lead weights along the bottom. Bottom gillnets are anchored or staked in position. Fish are caught while trying to pass through the net mesh. Gillnets are highly selective because the species and sizes of fish caught are dependent on the mesh size of the net. Bottom gillnets are used to catch a wide range of species. Bottom gillnets are fished in two different ways, as "standup" and "tiedown" nets (Williamson 1998). Standup nets are typically used to catch Atlantic cod, haddock, pollock, and hake and are soaked (duration of time the gear is set) for 12 to 24-hours. Tiedown nets are used to catch flounders and monkfish and are left in the water for 3 to 4 days. Other species caught in bottom gillnets in are dogfish and skates.

6.1.4.4 Hook and Line Gear

6.1.4.4.1 Hand Lines/Rod and Reel

The simplest form of hook-and-line fishing is the hand line, which may be fished using a rod and reel or simply “by hand”. The gear consists of a line, sinker (weight), gangion, and at least one hook. The line is typically stored on a small spool and rack and varies in length and the sinkers vary from stones to cast lead. The hooks can vary from single to multiple arrangements in “umbrella” rigs. An attraction device must be used with the hook, usually consisting of a natural bait or an artificial lure. Hand lines can be carried by currents until retrieved or fished in such as manner as to hit bottom and bounce (Stevenson et al. 2004). Hand lines and rods and reels are used in the Northeast Region to catch a variety of demersal species.

6.1.4.4.2 Mechanized Line Fishing

Mechanized line-hauling systems have been developed to allow smaller fishing crews to work more lines, and to use electrical or hydraulic power to work the lines on the spools. The reels, also called “bandits”, are mounted on the vessel bulwarks with the mainline wound around a spool. The line is taken from the spool over a block at the end of a flexible arm and each line may have a number of branches and baited hooks.

Jigging machines are used to jerk a line with several unbaited hooks up in the water to snag a fish in its body and is commonly used to catch squid. Jigging machine lines are generally fished in waters up to 600 m (1970 ft) deep. Hooks and sinkers can contact the bottom, depending upon the way the gear is used and may catch a variety of demersal species.

6.1.4.5 Longlines

The remaining gear type that is used by the fishery are bottom longlines which are a long length of line, often several miles long, to which short lengths of line ("gangions") carrying baited hooks are attached. Longlining is undertaken for a wide range of bottom species. Bottom longlines typically have up to six individual longlines strung together for a total length of more than 450 m and are deployed with 9 to 11 kg anchors. The mainline is a parachute cord. Gangions are typically 40 centimeters (cm) long and 1 to 1.8 m apart and are made of shrimp twine. These longlines are usually set for a few hours at a time (NREFHSC 2002).

When fishing with hooks, all hooks must be 12/0 circle hooks. A “circle hook” is, defined as a hook with the point turned back towards the shank and the barbed end of the hook is displaced (offset) relative to the parallel plane of the eyed-end or shank of the hook when laid on its side. The design of circle hooks enables them to be employed to reduce the damage to habitat features that would occur with use of other hook shapes (NREFHSC 2002).

6.1.4.6 Gear Interaction with Habitat

Historically, commercial fishing in the region has been conducted using hook and line, longline, gillnets and trawls. For decades, trawls have been intensively used throughout the region and have accounted for the majority of commercial fishing activity in the multispecies fishery off New England.

Amendment 13 (NEFMC 2003) describes the general effects of bottom trawls on benthic marine habitats. The primary source document used for this analysis was an advisory report prepared for the International Council for the Exploration of the Seas (ICES) that identified a number of possible effects of beam trawls and bottom otter trawls on benthic habitats (ICES 2000). This report is based on scientific findings summarized in Lindeboom and de Groot (1998), which were peer-reviewed by an ICES working group. The focus of the report is the Irish Sea and North Sea, but it also includes assessments of effects in other areas. Two general conclusions were: 1) low-energy environments are more affected by bottom trawling; and 2) bottom trawling affects the potential for habitat recovery (i.e., after trawling ceases, benthic communities and habitats may not always return to their original pre-impacted state). Regarding direct habitat effects, the report also concluded that:

Loss or dispersal of physical features such as peat banks or boulder reefs (changes are always permanent and lead to an overall change in habitat diversity, which in turn leads to the local loss of species and species assemblages dependent on such features);

Loss of structure-forming organisms such as bryozoans, tube-dwelling polychaetes, hydroids, seapens, sponges, mussel beds, and oyster beds (changes may be permanent leading to an overall change in habitat diversity, which could in turn lead to the local loss of species and species assemblages dependent on such biogenic features);

Reduction in complexity caused by redistributing and mixing of surface sediments and the degradation of habitat and biogenic features, leading to a decrease in the physical patchiness of the seafloor (changes are not likely to be permanent); and

Alteration of the detailed physical features of the seafloor by reshaping seabed features such as sand ripples and damaging burrows and associated structures that provide important habitats for smaller animals and can be used by fish to reduce their energy requirements (changes are not likely to be permanent).

A more recent evaluation of the habitat effects of trawling and dredging was prepared by the Committee on Ecosystem Effects of Fishing for the National Research Council’s Ocean Studies Board (NRC 2002). Trawl gear evaluated included bottom otter trawls and beam trawls. This report identified four general conclusions regarding the types of habitat modifications caused by trawls:

Trawling reduces habitat complexity;

Repeated trawling results in discernible changes in benthic communities;

Bottom trawling reduces the productivity of benthic habitats; and

Fauna that live in low natural disturbance regimes are generally more vulnerable to fishing gear disturbance.

An additional source of information for various gear types that relates specifically to the Northeast region is the report of a “Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern U.S.” sponsored by the NEFMC and Mid-Atlantic Fishery Management Council (MAFMC) in October 2001 (NEFSC 2002). A panel of invited fishing industry members and experts in the fields of benthic ecology, fishery ecology, geology, and fishing gear technology convened for the purpose of assisting the NEFMC, MAFMC, and NMFS with: 1) evaluating the existing scientific research on the effects of fishing gear on benthic habitats; 2) determining the degree of impact from various gear types on benthic habitats in the Northeast; 3) specifying the type of evidence that is available to support the conclusions made about the degree of impact; 4) ranking the relative importance of gear impacts on various habitat types; and 5) providing recommendations on measures to minimize those adverse impacts. The panel was provided with a summary of available research studies that summarized information relating to the effects of bottom otter trawls, bottom gillnets, and longlines. Relying on this information plus professional judgment, the panel identified the effects and the degree of impact of these gears on mud, sand, and gravel/rock habitats.

Additional information is provided in this report on the recovery times for each type of impact for each gear type in mud, sand, and gravel habitats ("gravel" includes other hard-bottom habitats). This information made it possible to rank these three substrates in terms of their vulnerability to the effects of bottom trawling, although other factors such as frequency of disturbance from fishing and from natural events are also important. In general, impacts from trawling were determined to be greater in gravel/rock habitats with attached epifauna. Impacts on biological structure were ranked higher than impacts on physical structure. Effects of trawls on major physical features in mud (deep water clay-bottom habitats) and gravel bottom were described as permanent, and impacts to biological and physical structure were given recovery times of months to years in mud and gravel. Impacts of trawling on physical structure in sand were of shorter duration (days to months) given the exposure of most continental shelf sand habitats to strong bottom currents and/or frequent storms.

According to the panel, impacts of sink gillnets and longlines on sand and gravel habitats would result in low degree impacts (NEFSC 2002). Duration of impacts to physical structures from these gear types would be expected to last days to months on soft mud but could be permanent on hard bottom clay structures along the continental slope. Impacts to mud would be caused by gillnet lead lines and anchors. Physical habitat impacts from sink gillnets and longlines on sand would not be expected.

The contents of a second expert panel report, produced by the Pew Charitable Trusts and entitled "Shifting Gears: Addressing the Collateral Impacts of Fishing Methods in U.S. Waters" (Morgan and Chuenpagdee 2003), was also summarized in Amendment 13. This group evaluated the habitat effects of 10 different commercial fishing gears used in U.S. waters. The report concluded that bottom trawls have relatively high habitat impacts, bottom gillnets and pots and traps have low to medium impacts, and bottom longlines have low impacts. As in the International Council for Exploration of the Sea (ICES) and National Research Council (NRC) reports, individual types of trawls and dredges were not evaluated. The impacts of bottom gillnets, traps, and longlines were limited to warm or shallow water environments with rooted aquatic vegetation or "live bottom" environments (e.g., coral reefs).

6.1.5 Assemblages of Fish Species

Georges Bank and the Gulf of Maine have been historically characterized by high levels of fish production. Several studies have attempted to identify demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth-related groundfish assemblages for Georges Bank and the Gulf of Maine that were persistent temporally and spatially. Depth and salinity were identified as major physical influences explaining assemblage structure. Gabriel (1992) identified six assemblages, which are compared with the results of Overholtz and Tyler (1985) in Table 16 (adapted from Amendment 16). For the Affected Area, including southern New England, these assemblages and relationships are considered to be relatively consistent for purposes of general description. The assemblages include allocated target, non-allocated target, and bycatch species. As presented in Table 16, the terminology and definitions of habitat types varies slightly between the two studies. For further information on fish habitat relationships, see Table 14.

Table 16 – Comparison of demersal fish assemblages of Georges Bank and the Gulf of Maine

Overholtz and Tyler (1985)		Gabriel (1992)	
Assemblage	**Species**	**Species**	**Assemblage**
Slope and Canyon	offshore hake blackbelly rosefish Gulf stream flounder fourspot flounder, goosefish, silver hake, white hake, red hake	offshore hake blackbelly rosefish Gulf stream flounder fawn cusk-eel, longfin hake, armored sea robin	Deepwater
Intermediate	silver hake red hake goosefish Atlantic cod, haddock, ocean pout, yellowtail flounder, winter skate, little skate, sea raven, longhorn sculpin	silver hake red hake goosefish northern shortfin squid, spiny dogfish, cusk	Combination of Deepwater Gulf of Maine/Georges Bank and Gulf of Maine-Georges Bank Transition
Shallow	Atlantic cod haddock pollock silver hake white hake red hake goosefish ocean pout	Atlantic cod haddock pollock	Gulf of Maine-Georges Bank Transition Zone
	yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin summer flounder sea raven, sand lance	yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin	Shallow Water Georges Bank-southern New England
Gulf of Maine-Deep	white hake American plaice witch flounder thorny skate silver hake, Atlantic cod, haddock, cusk, Atlantic wolffish	white hake American plaice witch flounder thorny skate redfish	Deepwater Gulf of Maine-Georges Bank
Northeast Peak	Atlantic cod haddock pollock ocean pout, winter flounder, white hake, thorny skate, longhorn sculpin	Atlantic cod haddock Pollock	Gulf of Maine-Georges Bank Transition Zone

6.2 Target Species

This section describes the species life history and stock population status for each of the 20 fish stocks that are managed under the Northeast Multispecies FMP that would be harvested by the groundfish fishery under provisions of the FMP. The description of species habitat associations described in Section 6.1.2 provides context for considering the interactions between gear and species. A comparison of depth-related demersal fish assemblages of Georges Bank and the Gulf of Maine is also provided for additional context. The discussion of allocated target species is concluded with an analysis of the interaction between the gear types the fishery will use (as described in Section 6.1.4) and allocated species. Most of the following discussions have been adapted largely from the GARM III report (NEFSC 2008) and can be accessed via the NEFMC website at http://www.nefmc.org.

6.2.1 Description of the Managed Species

6.2.1.1 Northeast Multispecies Complex

The management unit is described in Amendment 16 to the FMP. Life history and habitat characteristics of the stocks managed in this FMP can be found in the Essential Fish Habitat Source documents (series) published as NOAA Technical Memorandums and available at http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

Recent revisions to the National Standard guidelines (50 CFR 600.310, published in 74 *FR* 3178) expanded on the classification of stocks in an FMP. For the Northeast Multispecies FMP, the stocks identified as the management unit are considered "stocks in the fishery" as defined by the NSGs. There are no stocks currently identified as "ecosystem component species," though this classification may be used in the future.

The managed stocks/stocks in the fishery are:

- GOM cod
- GB cod
- GOM haddock
- GB haddock
- CC/GOM yellowtail flounder
- GB yellowtail flounder
- SNE/MA yellowtail flounder
- GOM winter flounder
- GB winter flounder
- SNE/MA winter flounder
- GOM/GB (Northern) windowpane flounder
- SNE/MA (Southern) windowpane flounder
- Atlantic halibut
- Atlantic wolffish
- Plaice
- Ocean pout
- Pollock
- Redfish
- White hake
- Witch flounder

A full description of the life history of these stocks can be found in Framework 44 (NEFMC 2010); no information in that section has been updated.

6.2.1.2 Summary of Groundfish Stock Status

The Groundfish Assessment Review Meeting (GARM III) conducted during October 2007 – August 2008 provided benchmark assessments for the 19 groundfish stocks managed under the Northeast Multispecies Fishery Management Plan. The GARM III process involved in-depth reviews of the data, models, biological reference points, and assessments of each of the 19 groundfish stocks at the time. This section summarizes the stock status in terms of biomass (B) or spawning stock biomass (SSB) and fishing mortality (F) through 2007 as reported in NEFSC (2008) for stocks that were not assessed since GARM III. Projected SSB and F were estimated in 2008 and 2009 for most of the age-based GARM assessments.

Seven of the 20 groundfish stocks have been assessed since GARM III either through the SARC, TRAC or the Data Poor Working Group. The Georges Bank yellowtail assessment is updated each year through the TRAC and pollock was assessed in 2010 during SARC 50. In 2011 the three winter flounder stocks (GM, SNE, and GB) were assessed at SARC 52 and Gulf of Maine Cod was assessed in SARC 53.

Atlantic wolffish was added to the multispecies groundfish stock complex in A16. Wolffish was assessed in 2008 in the Data Poor Working Group (DPWG 2008). A range of knife edge maturity and selectivity assumptions were used to characterize stock status due to a general lack of biological data on this stock.

Stock status determination from GARM III and subsequent groundfish assessments that were overfished or experiencing overfishing can be seen in Table 17. A total of 12 stocks were overfished (B less than ½ B_{MSY}) while 7 stocks were not overfished. A total of 8 stocks were experiencing overfishing (F greater than F_{MSY}) while 11 stocks were not experiencing overfishing. Seven of the stocks are both overfished and experiencing overfishing (GB cod, GOM cod, white hake, CC-GOM yellowtail, SNE yellowtail, witch flounder, and Northern windowpane). Six stocks (redfish, American plaice, GB haddock, GOM haddock, GB winter flounder and pollock) were classified as not overfished and not experiencing overfishing. Note the GOM winter flounder overfished status could not be determined and the overfishing status for wolffish was unknown but fishing mortality has declined in 2007.

Of the 15 groundfish stocks assessed using an analytical assessment model, 5 stocks exhibited retrospective patterns that were considered severe enough that an adjustment to the population numbers and fishing mortality in the terminal year was deemed necessary before determining current stock status and subsequently conducting projections. Retrospective pattern adjustments were done one of two ways: either a split in the survey time series during the mid-1990s or an adjustment to the population numbers at age in the terminal year based upon a measure of the age-specific retrospective pattern during the past seven years. Only for American plaice and redfish were the population numbers adjusted. For the other three stocks (GB cod, GB yellowtail, and witch flounder) the split survey was used. The remaining ten stocks were judged to have a mild retrospective pattern that did not require an adjustment.

Since GARM II, many stocks have exhibited long term declines in weights-at-age. Age-specific fishery selectivity has also shifted in many stocks to older age groups due to a combination of reduced growth, fishery management measures, and changing fishing practices. These trends were incorporated into the updated biological reference points for the 19 groundfish stocks, and as a consequence many of the newly-estimated biomass reference points are now lower and the fishing mortality reference points higher than those estimated in GARM II. However, a direct one-to-one comparison between the old and new BRPs is inappropriate because of these changes in weights and partial recruitment at age.

Analyses from an ecosystem basis suggest current biomass management targets (B_{MSY}s) for GARM stocks are reasonable. The current targets compare favorably with the results of recent and historical studies in the region and are also in general agreement with results of many studies for other worldwide ecosystems. New summed BRPs for the GARM stocks are similar to BRPs from an aggregate surplus production model for these stocks. Aggregate model results suggest that the overall fishing mortality rate should be relatively low (F=0.15) to obtain MSY for this complex of GARM stocks.

Table 17 summarizes groundfish stocks based on results from GARM III, subsequent SARCs (50, 52, 53), the 2011 TRAC, and the 2008 Data Poor Working Group (DPWG). The stock-specific plots that follow table 18 also show the estimates of current stock status based on projecting forward from recent catch estimates for the age based GARM III stocks.

Table 17 – Summary of groundfish stock status

Stock	Assessment	Terminal Year	Terminal year F	Fmsy	Terminal year Biomass	Bmsy	MSY	Overfished Status	Overfishing Status
Georges Bank cod	GARM III	2007	0.303	0.247	17,672	148,084	31,159	Overfished	Overfishing
Gulf of Maine cod	SARC 53	2010	1.143	0.200	11,868	61,218	10,392	Overfished	Overfishing
Georges Bank haddock	GARM III	2007	0.229	0.350	315,975	158,873	32,746	Not Overfished	No Overfishing
Gulf of Maine haddock	GARM III	2007	0.346	0.430	5,850	5,900	1,360	Not Overfished	No Overfishing
Georges bank Yellowtail	TRAC 2011	2010	0.130	0.254	8,802	43,200	9,400	Overfished	No Overfishing
Southern New England-Mid Atlantic Yellowtail	GARM III	2007	0.413	0.254	3,508	27,400	6,100	Overfished	Overfishing
Cape Cod-Gulf of Maine yellowtail	GARM III	2007	0.414	0.239	1,922	7,790	1,720	Overfished	Overfishing
American plaice	GARM III	2007	0.094	0.190	11,106	21,940	4,011	Not Overfished	No Overfishing
Witch flounder	GARM III	2007	0.292	0.200	3,434	11,447	2,352	Overfished	Overfishing
Georges Bank winter flounder	SARC 52	2010	0.154	0.420	9,703	11,800	4,400	Not Overfished	No Overfishing
Gulf of Maine winter flounder	SARC 52	2010	0.03 [1]	0.23 [1]	6,341 [1]	Unknown	Unknown	Unknown	No Overfishing
Southern New England-Mid-Atlantic winter flounder	SARC 52	2010	0.050	0.290	7,076	43,661	11,728	Overfished	No Overfishing
Acadian redfish	GARM III	2007	0.007	0.038	172,342	271,000	10,139	Not Overfished	No Overfishing
white hake	GARM III	2007	0.150	0.125	19,800	56,254	5,800	Overfished	Overfishing
pollock	SARC 50	2009	0.070	0.25	196000	91000	16,200	Not Overfished	No Overfishing
northern windowpane [2]	GARM III	2007	1.96	0.50	0.24 [3]	1.4	700	Overfished	Overfishing
southern windowpane [2]	GARM III	2007	1.85	1.47	0.19 [3]	0.34	500	Not Overfished	Overfishing
ocean pout [2]	GARM III	2007	0.38	0.76	0.48	4.94	3,754	Overfished	No Overfishing
Atlantic halibut	GARM III	2007	0.065	0.073	1,300	49,000	3,500	Overfished	No Overfishing
Atlantic wolffish	DPWG	2007	Unknown	0.233	562-998	1747-2202	278-311	Overfished	Unknown

[1] Assessment based on using survey area swept estimates. Terminal year F and Fmsy are shown as exploitation rates and termial year biomass as 30+ cm exploitable biomass.

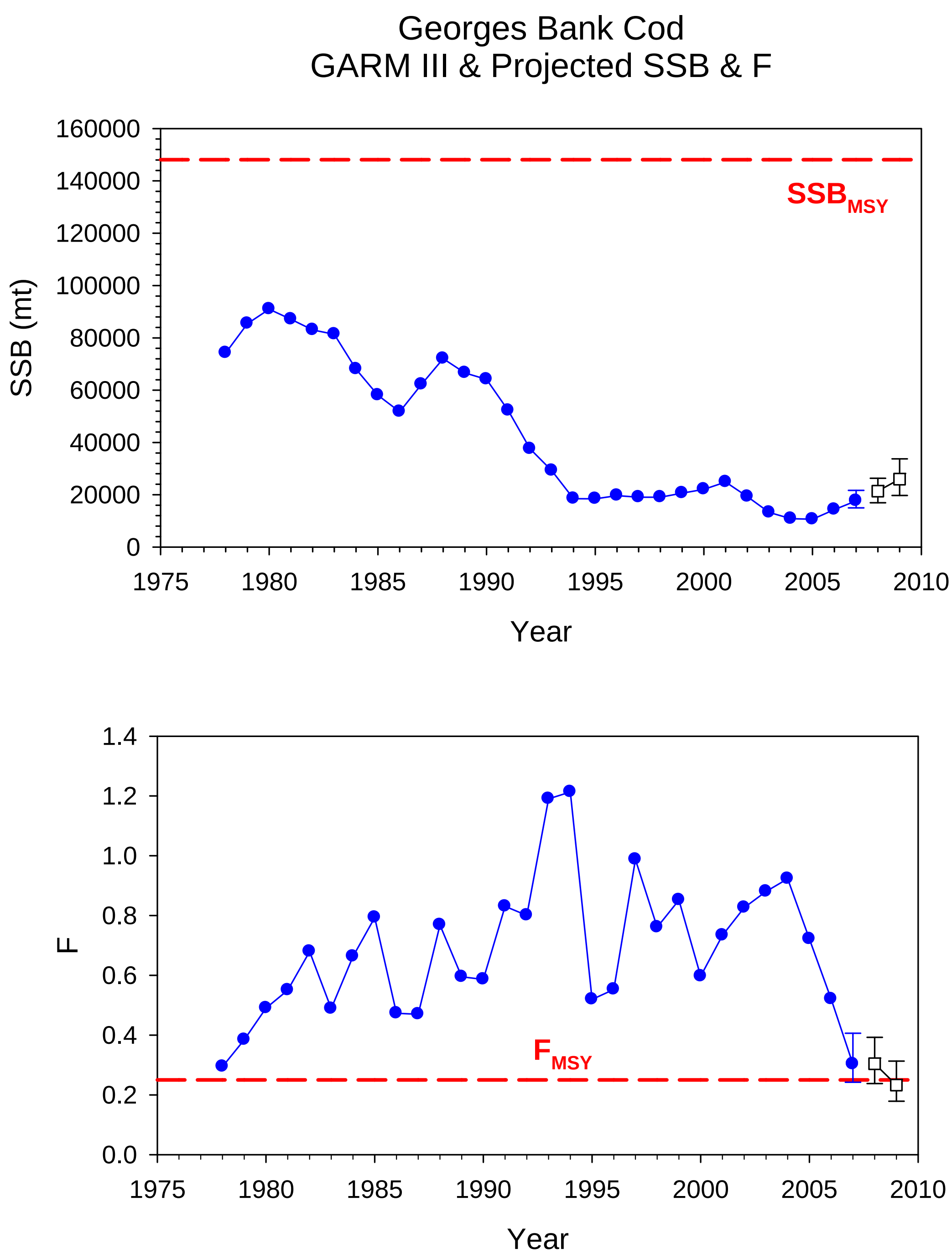
[2] Fmsy and Bmsy index proxies are listed for ocean pout, southern and northern windowpane. Values for GOM cod are SAW 53 results.

[3] Index point estimates are in the table. Status determination is made using the 3 year average (N windowpane = 0.53, S windowpane = 0.21 kg / tow).

[4] Model run based on the selectivity slope fixed at 0.15 and knive edge maturity at 65 cm.

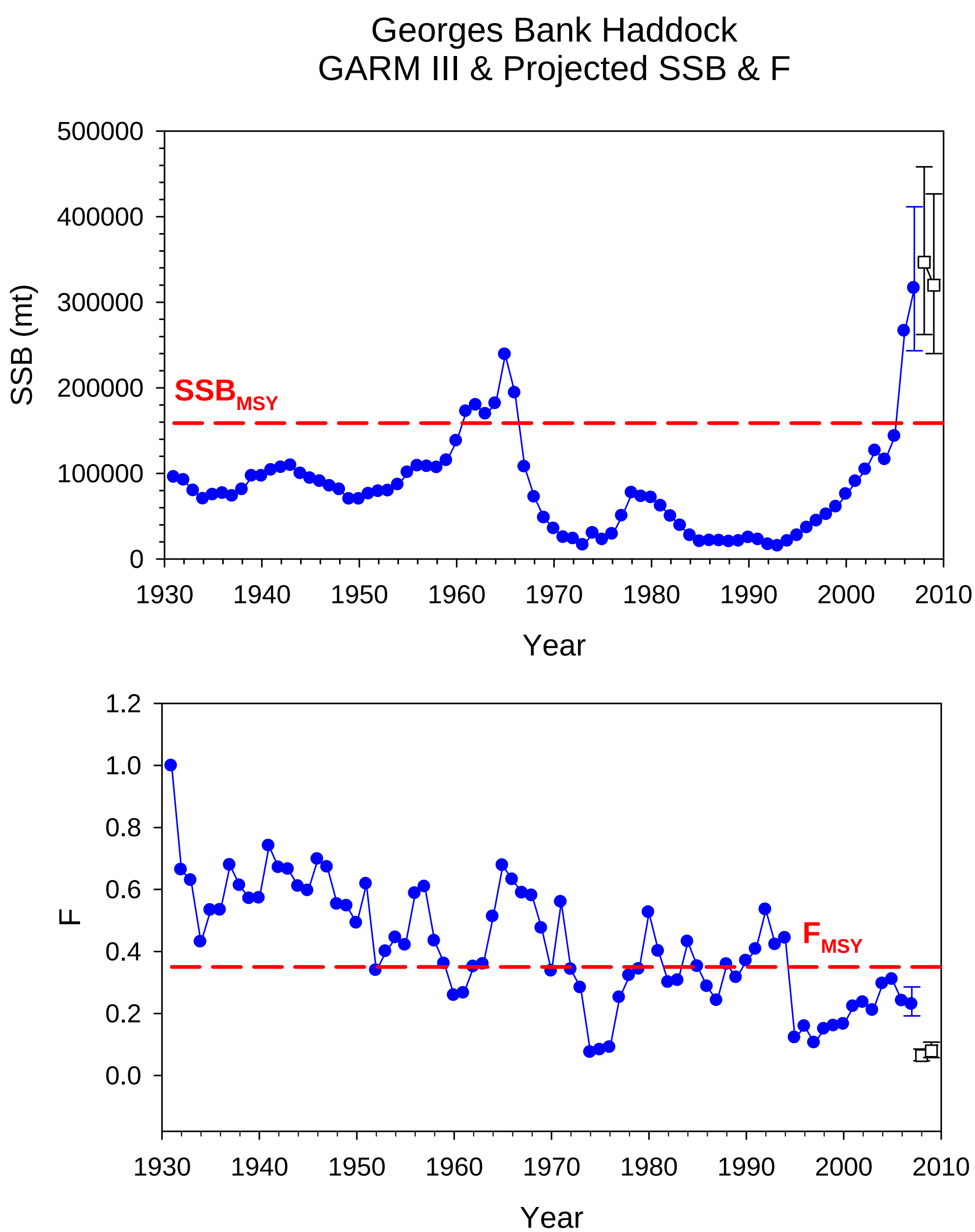
A. Georges Bank cod was overfished and was experiencing overfishing in 2007.
Spawning biomass has remained low since 1994. Fishing mortality has been decreasing since 2004. A split in the survey time series was used to adjust for the retrospective pattern.

Figure 8– Georges Bank cod spawning stock biomass (SSB) and fishing mortality (F) estimates during 1978-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



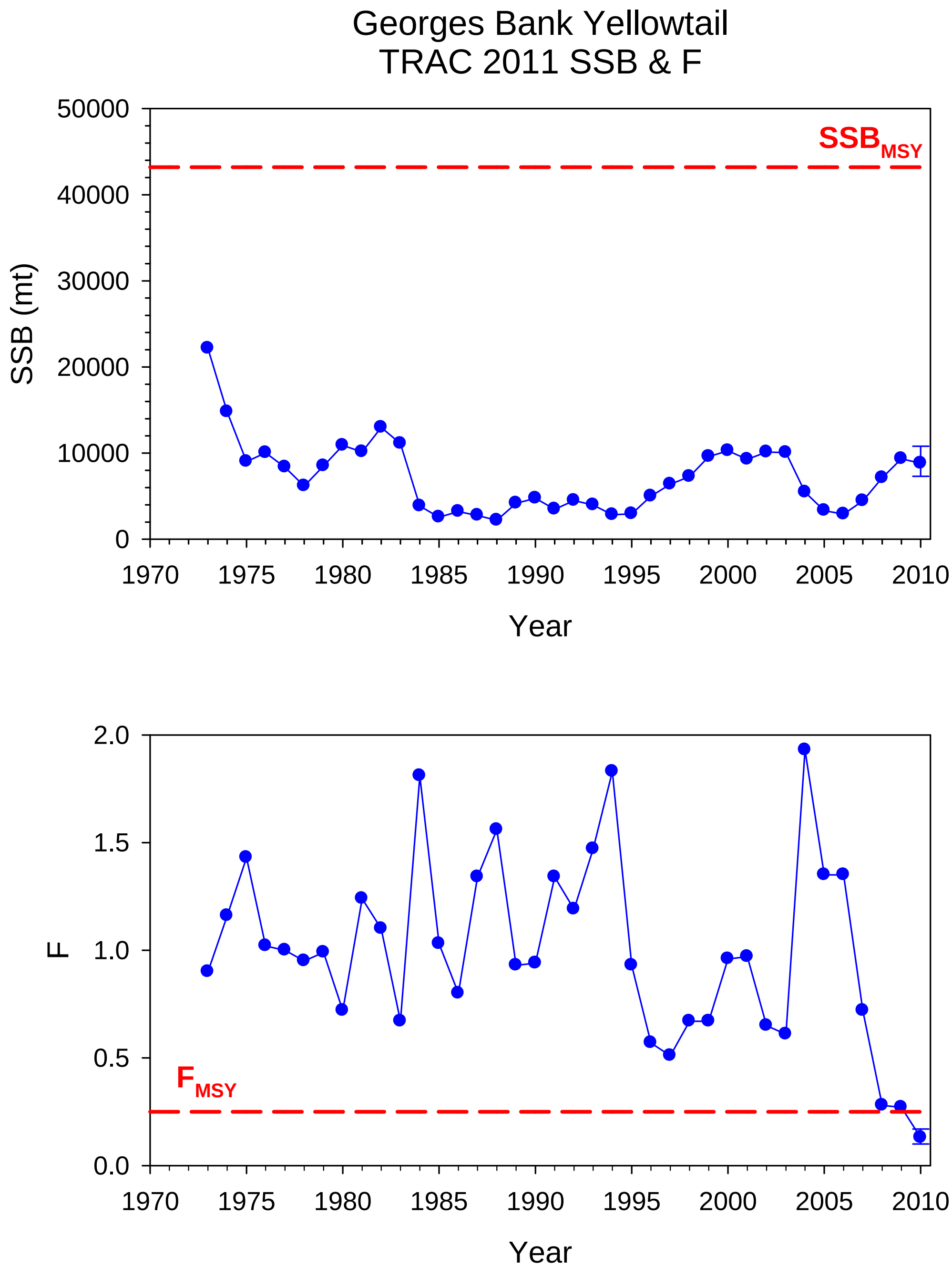
<u>B. Georges Bank haddock was not overfished and was not experiencing overfishing in 2007.</u> Georges Bank haddock has been rebuilt to about twice B_{msy}. Spawning biomass has increased since 1993. Fishing mortality has remained below F_{msy} since 1995. The partial recruited strong 2003 year class made up most of the catch in 2007. No retrospective adjustment was made for Georges Bank haddock.

Figure 9 – Georges Bank haddock spawning stock biomass (SSB) and fishing mortality (F) estimates during 1931-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



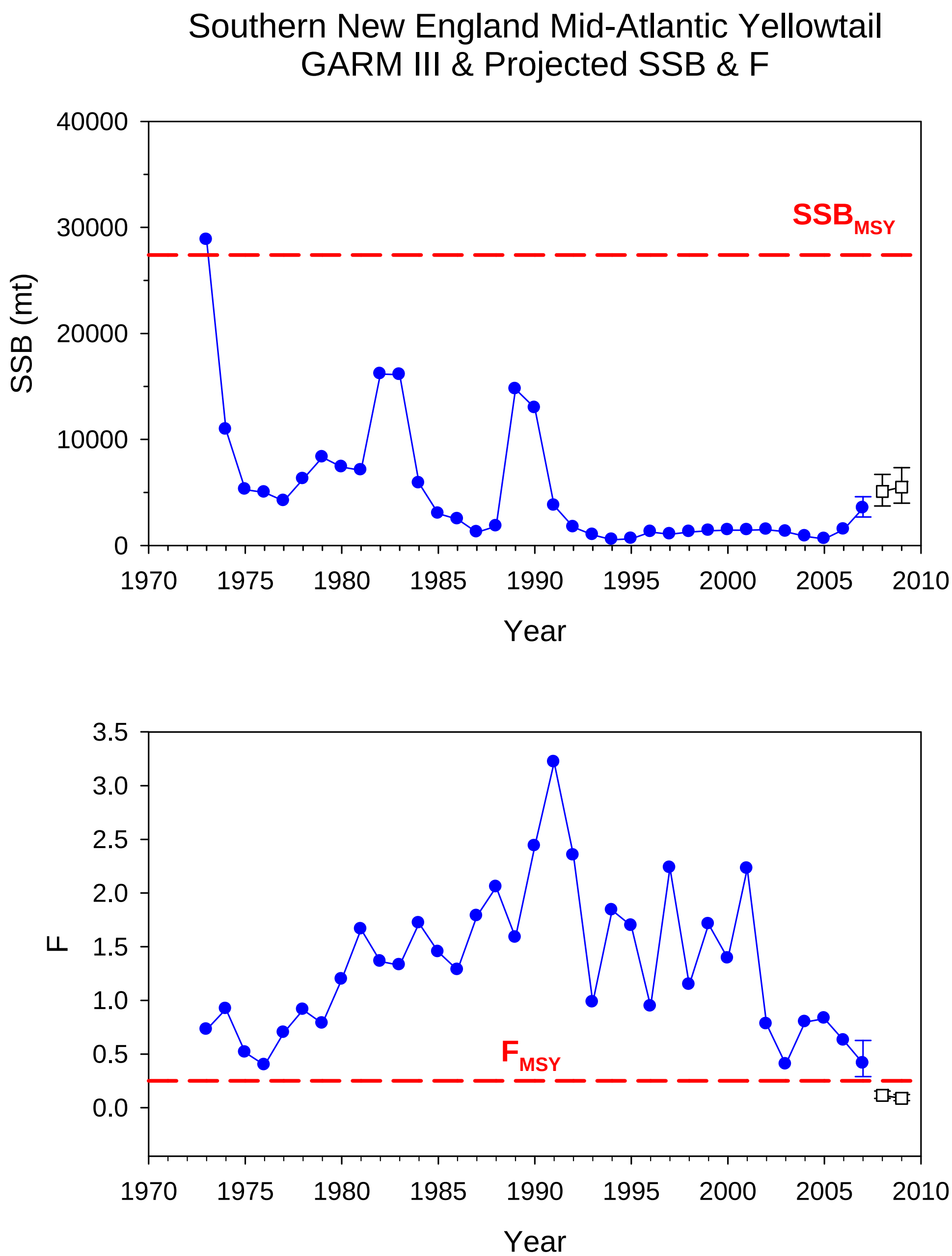
<u>C. Georges Bank yellowtail flounder was overfished and was not experiencing overfishing in 2010.</u>
Georges Bank yellowtail flounder was assessed at the TRAC 2011. Spawning biomass has been relatively low since 1984. Fishing mortality has had a decreasing trend since 2004. A split in the survey time series was used to adjust for the retrospective pattern.

Figure 10 – Georges Bank yellowtail flounder spawning stock biomass (SSB) and fishing mortality (F) estimates during 1973-2010 reported in TRAC 2011 along with 80% confidence intervals for 2010 estimates



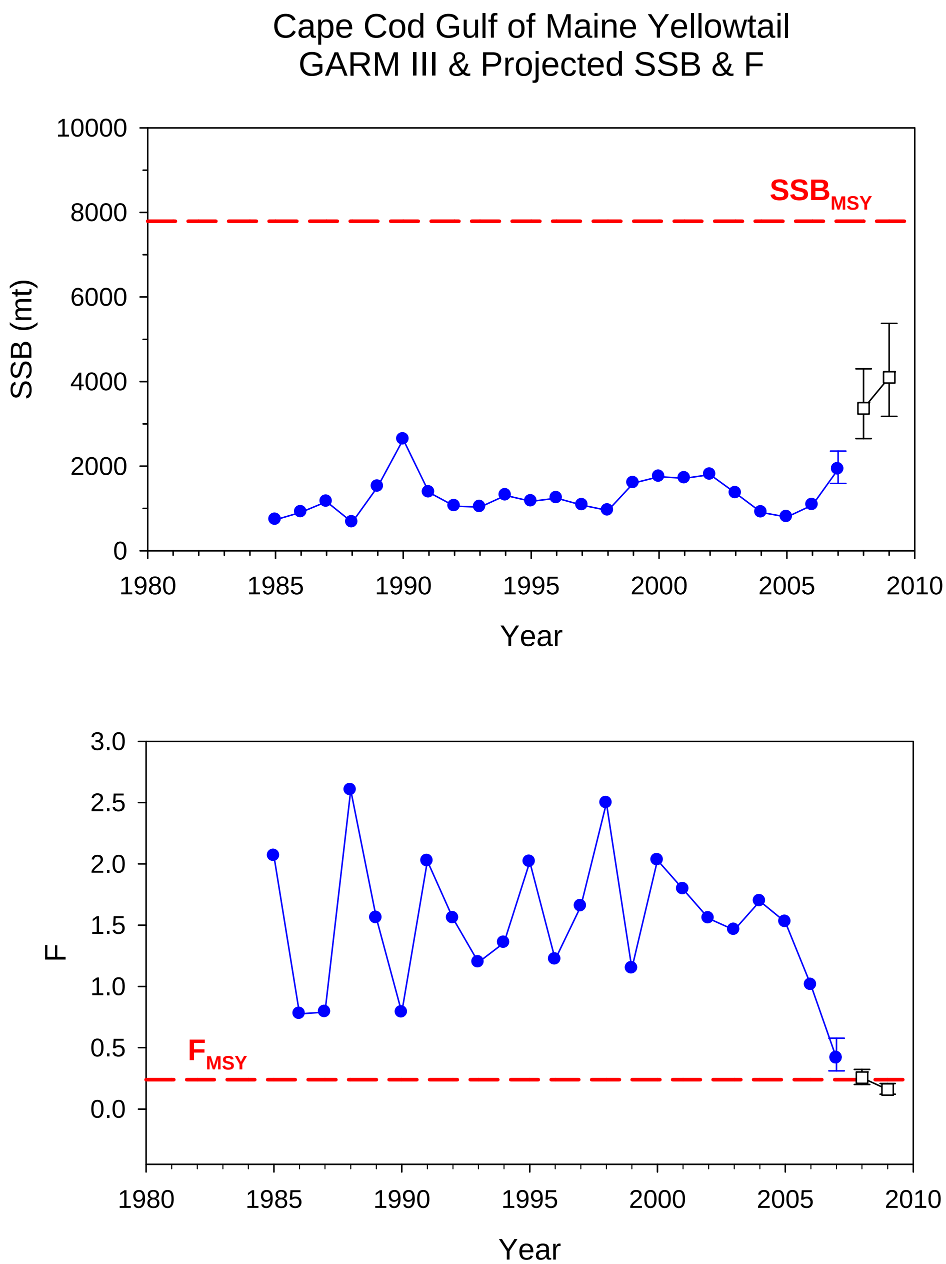
<u>D. Southern New England/Mid-Atlantic yellowtail flounder was overfished and was experiencing overfishing in 2007.</u> Spawning biomass has been low since 1991. There are some signs of rebuilding from a strong 2005 year class. Fishing mortality has had a decreasing trend since 2001 but remains slightly above F_{MSY}. No retrospective adjustment was made for SNE/Mid-Atlantic yellowtail flounder.

Figure 11 – Southern New England/Mid-Atlantic yellowtail flounder spawning stock biomass (SSB) and fishing mortality (F) estimates during 1973-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



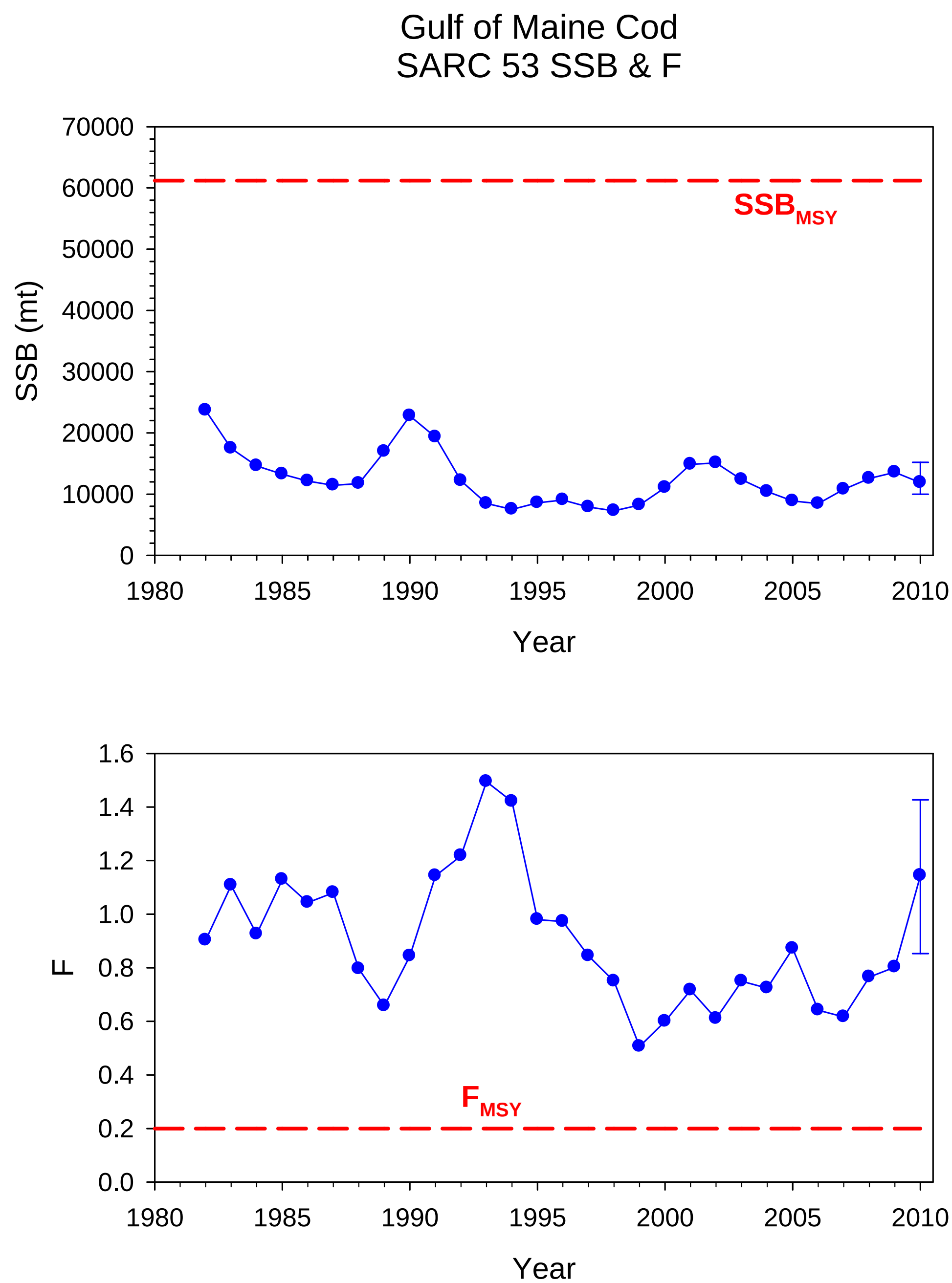
<u>E. Cape Cod/Gulf of Maine yellowtail flounder was overfished and was experiencing overfishing in 2007.</u> Spawning biomass been relatively low over the time series. There appears to be a moderately strong 2005 year class. Fishing mortality has decreased since 2004. No retrospective adjustment was made for Cape Cod/Gulf of Maine yellowtail flounder.

Figure 12 – Cape Cod/Gulf of Maine yellowtail flounder spawning stock biomass (SSB) and fishing mortality (F) estimates during 1985-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



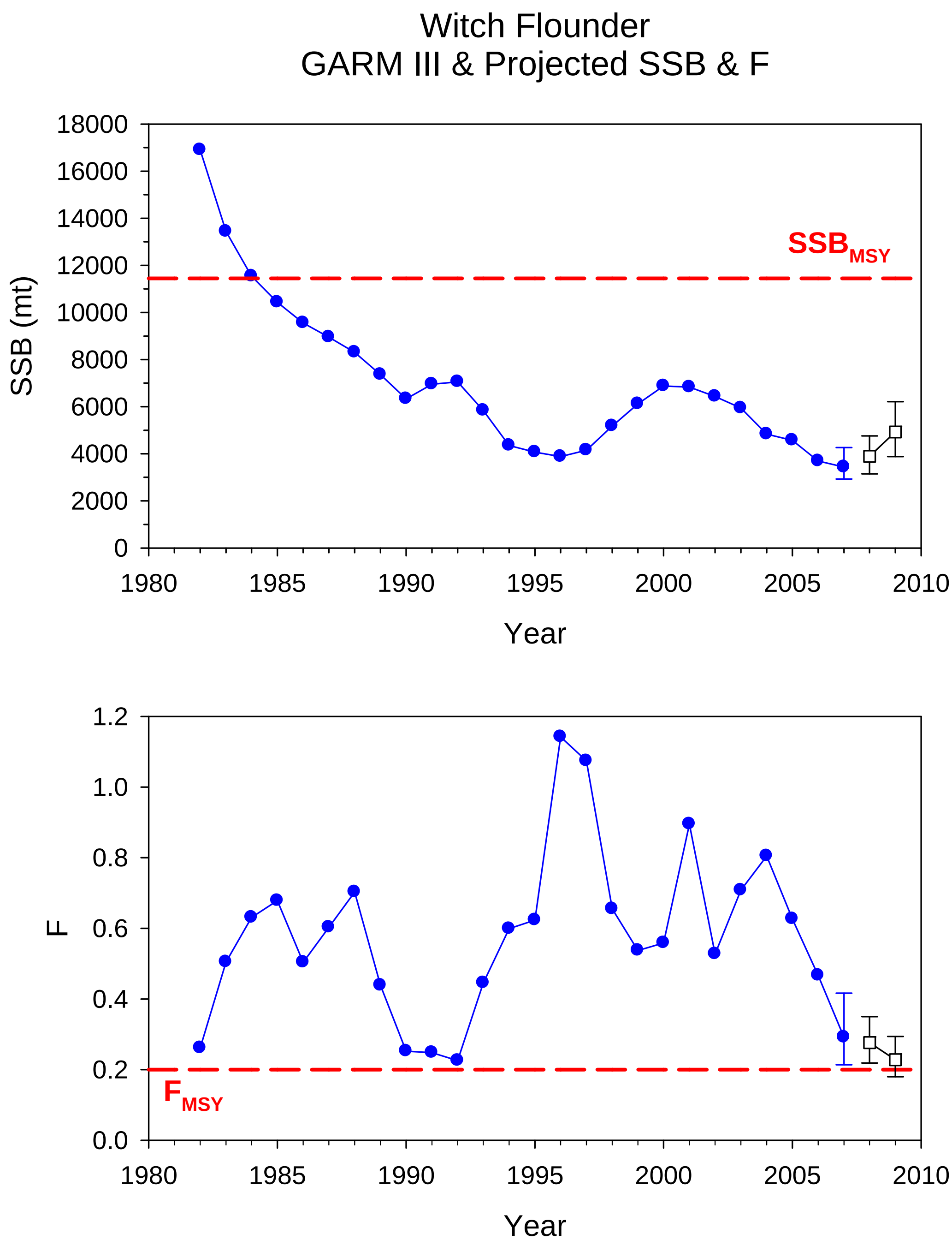
<u>F. Gulf of Maine cod was overfished and was experiencing overfishing in 2010.</u> Gulf of Maine cod was assessed at SARC 53 in 2011. Spawning biomass has been relatively low since 1982. Fishing mortality has been above the F_{msy} reference point since the start of the assessment time series in 1982. No retrospective adjustment was made for Gulf of Maine Cod.

Figure 13 – Gulf of Maine cod spawning stock biomass (SSB) and fishing mortality (F) estimates during 1982-2010 using SARC 53 (blue circles) data along with 80% confidence intervals for 2010 estimates



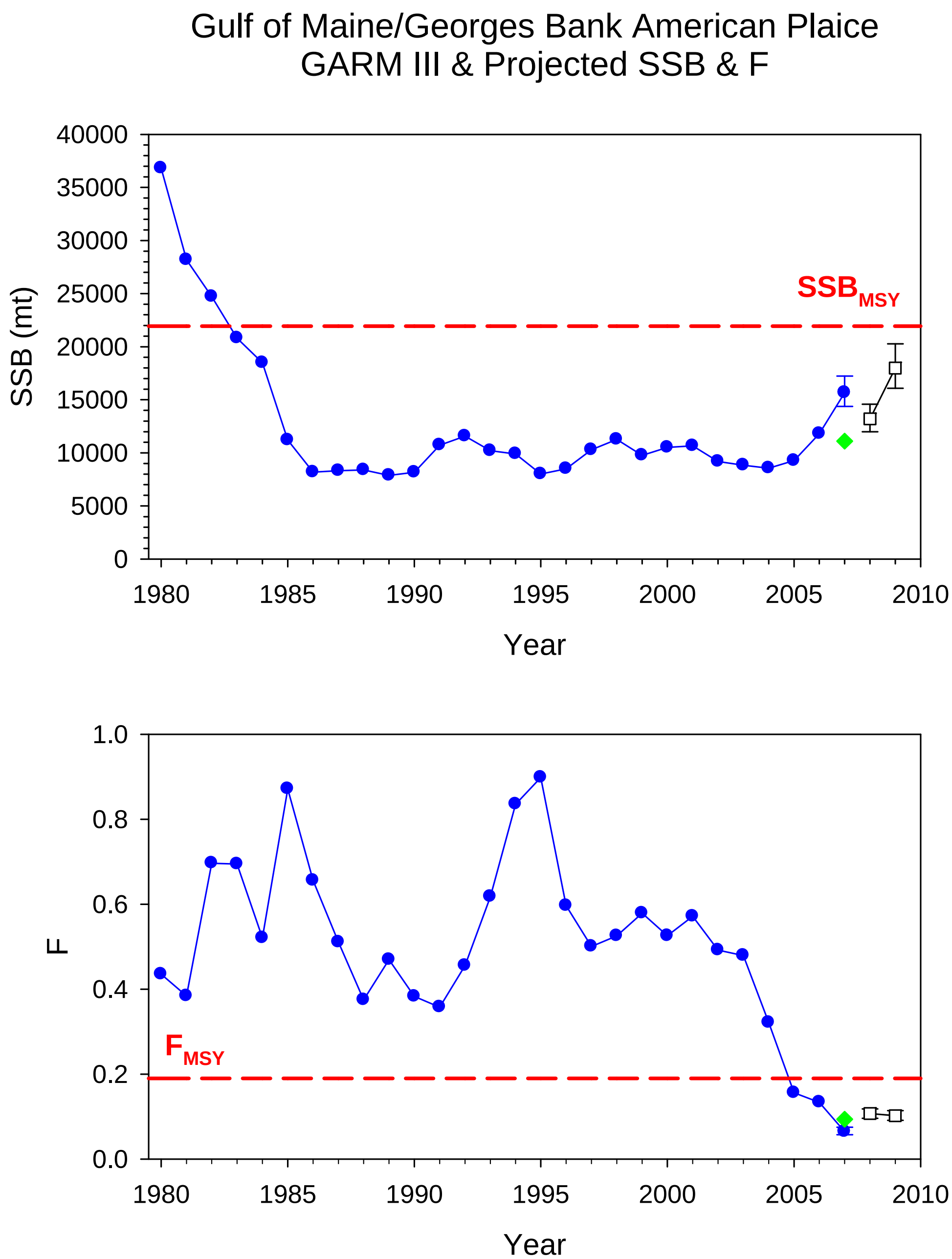
<u>G. Witch flounder was overfished and was experiencing overfishing in 2007.</u> Spawning biomass has declined since 2001 to a record low in 2007. Fishing mortality has decreased since 2004. A split in the survey time series was used to adjust for the retrospective pattern.

Figure 14 – Witch flounder spawning stock biomass (SSB) and fishing mortality (F) estimates during 1982-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



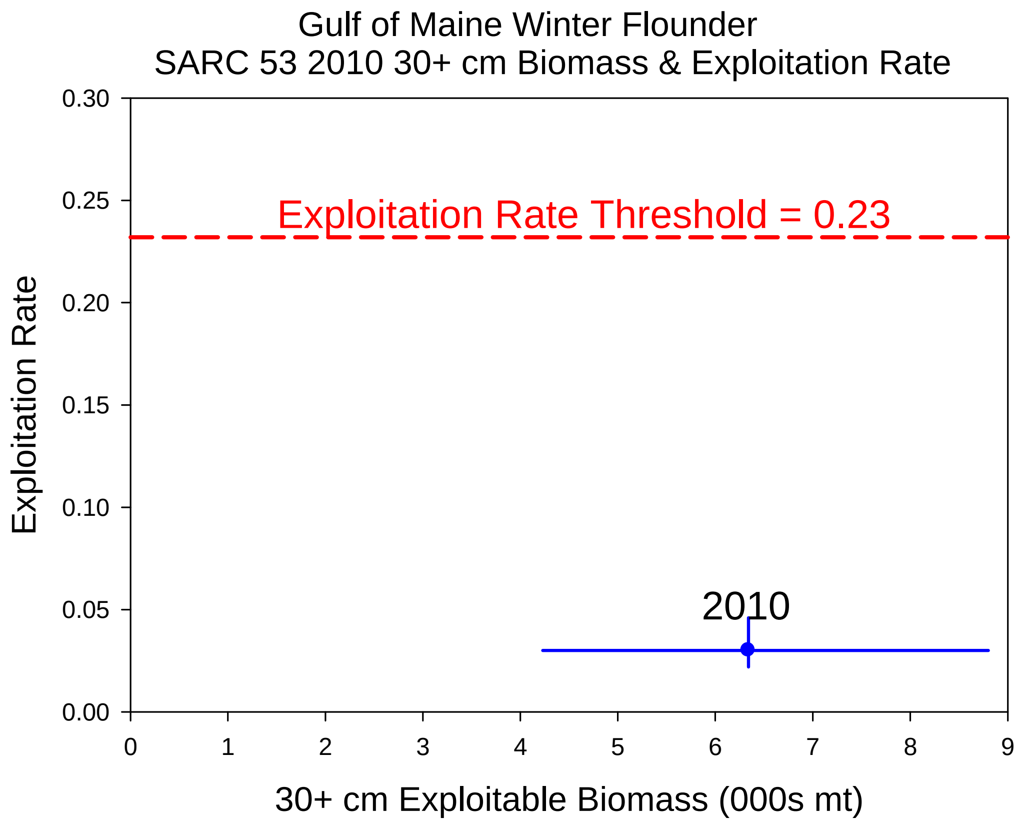
<u>H. American plaice was not overfished and was not experiencing overfishing in 2007.</u> Spawning biomass has been low with a slight increasing trend since 1986. Fishing mortality has had a decreasing trend since 1995. Terminal year population numbers and fishing mortality were adjusted with Mohn's rho estimates.

Figure 15 – American plaice spawning stock biomass (SSB) and fishing mortality (F) estimates during 1980-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Mohn's rho adjusted SSB and F are shown in the terminal year with a green diamond. Projected SSB and F with 80% confidence intervals are shown with open squares



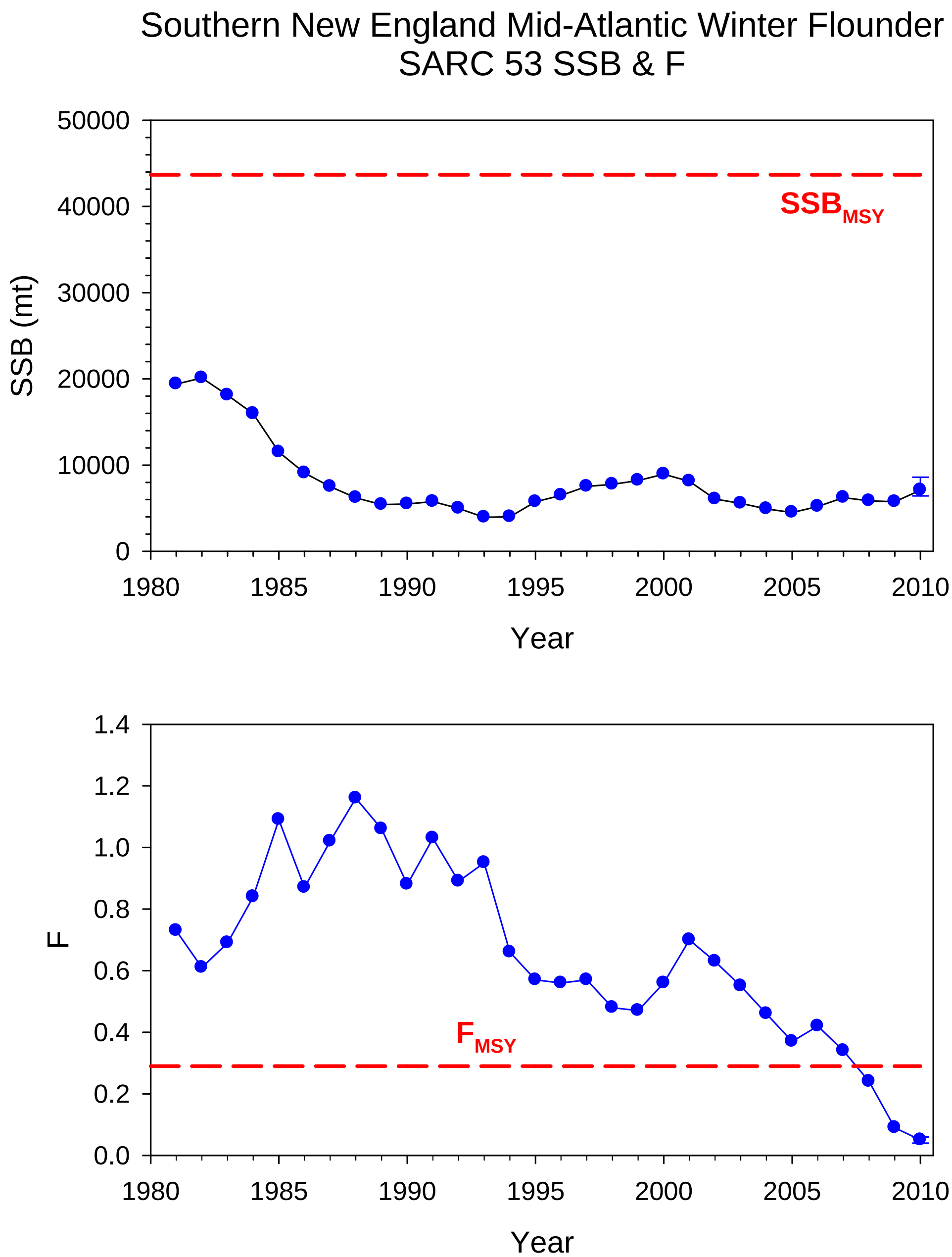
<u>I. Gulf of Maine winter flounder overfished status is unknown but was not experiencing overfishing in 2010.</u> Gulf of Maine winter flounder was assessed at SARC 52 in 2011. An analytical model was not accepted for GOM winter flounder at SARC 52. The assessment of GOM winter flounder stock is based on an empirical swept-area model utilizing data from the 2010 NEFSC fall survey, the MADMF fall survey, and the Maine-New Hampshire fall inshore survey.

Figure 16 – Stock status for Gulf of Maine winter flounder in 2010 (blue circle) with respect to the $F_{40\%}$ proxy for FMSY (red dashed line). 80% confidence intervals are shown for biomass and exploitation rate. F40% = 0.31, which corresponds to an exploitation rate of 0.23



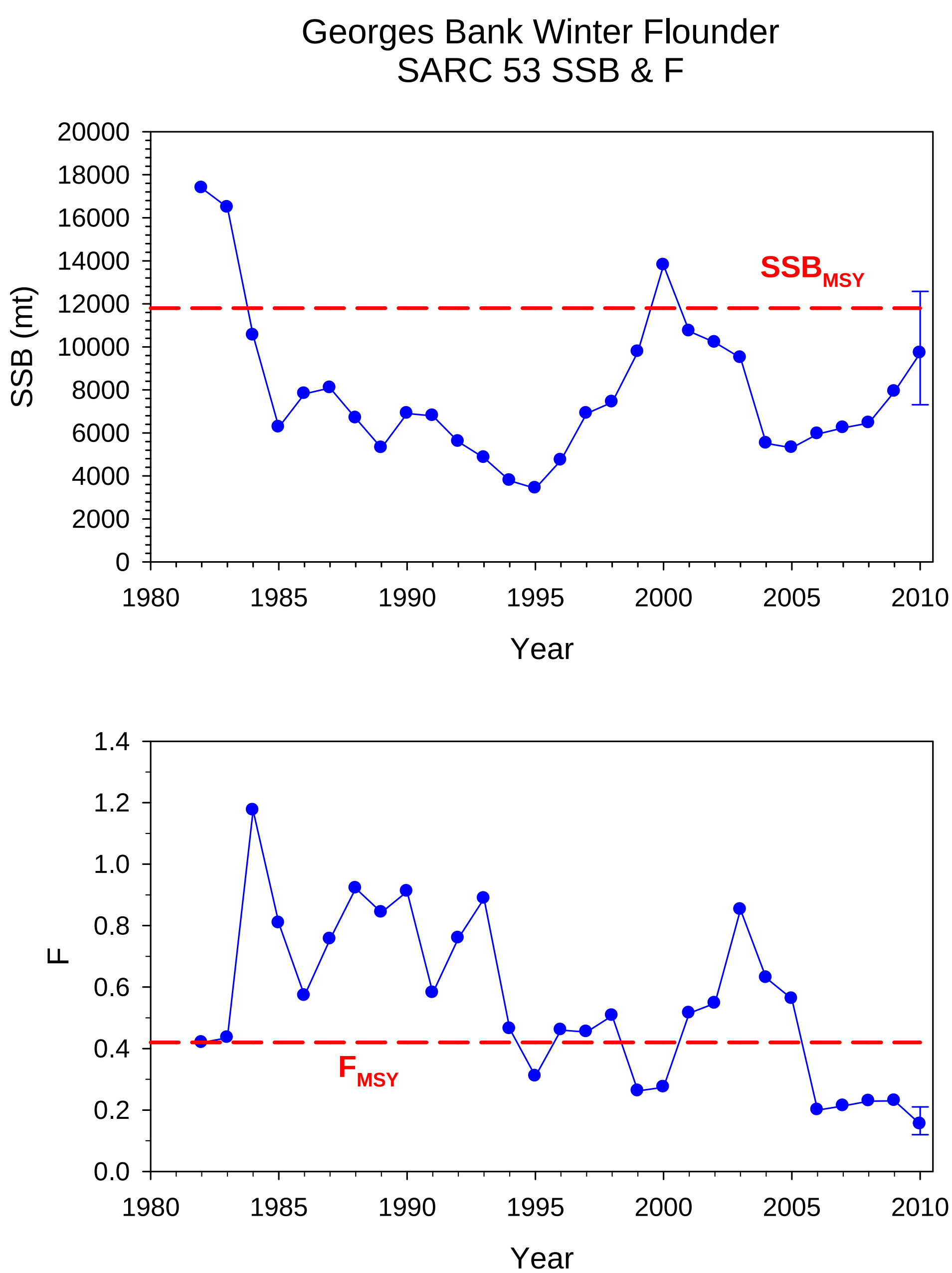
J. Southern New England/Mid-Atlantic winter flounder was overfished but was not experiencing overfishing in 2010. Southern New England/Mid-Atlantic winter flounder was assessed at SARC 52 in 2011. Spawning biomass has been very low since 1981. Fishing mortality has been declining since 2006 and has been below F_{msy} since 2008. No retrospective adjustment was made for SNE winter flounder.

Figure 17 – Southern New England/Mid-Atlantic winter flounder spawning stock biomass (SSB) and fishing mortality (F) estimates during 1981-2010 reported in SARC 52 (blue circles) along with 80% confidence intervals for 2010 estimates



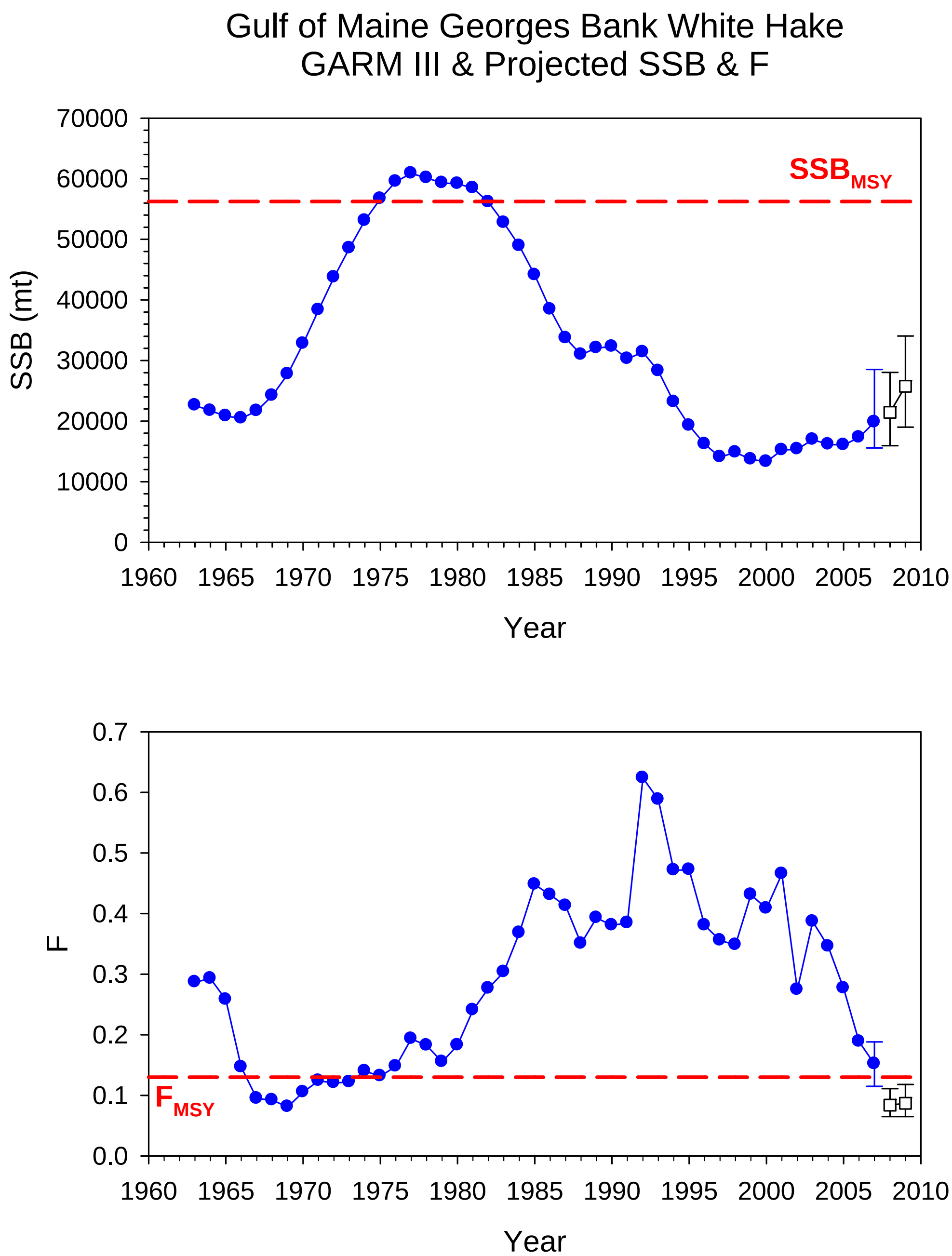
K. Georges Bank winter flounder was not overfished and was not experiencing overfishing in 2010. Georges Bank winter flounder was assessed at SARC 52 in 2011. Spawning Biomass has increased since 2005. Fishing mortality has been below F_{msy} from 2006 to 2010. No retrospective adjustment was made for Georges Bank winter flounder.

Figure 18 – Georges Bank winter flounder spawning stock biomass (B) and fishing mortality (F) estimates during 1982-2010 reported in SARC 52 (blue circles) along with 80% confidence intervals for 2010 estimates



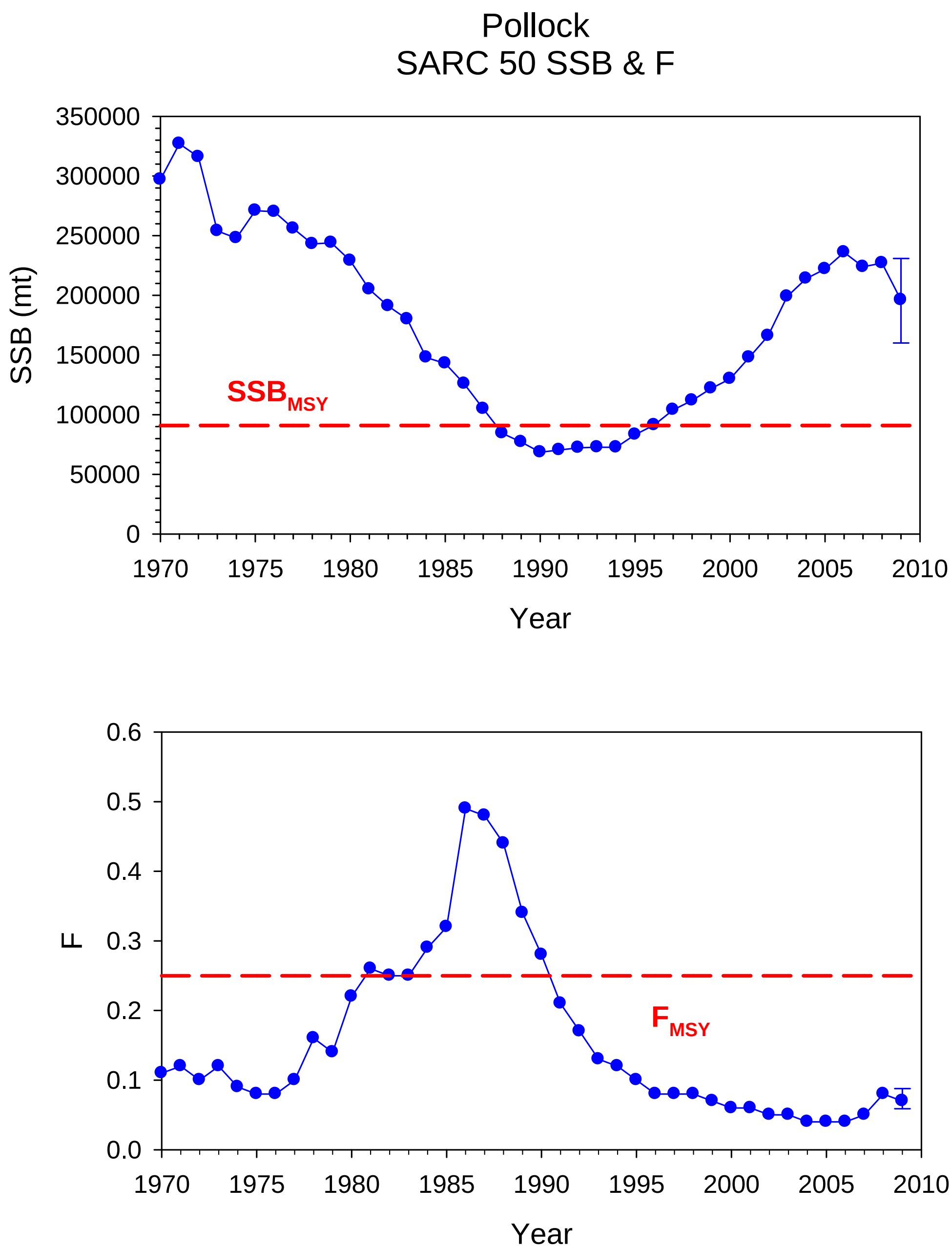
<u>L. White hake was overfished and was experiencing overfishing in 2007.</u> Biomass increased slightly during 2000-2007. Fishing mortality has declined since 2003. No retrospective adjustment was made for white hake.

Figure 19 – Georges Bank/Gulf of Maine white hake spawning stock biomass (SSB) and fishing mortality rate (F) during 1963-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



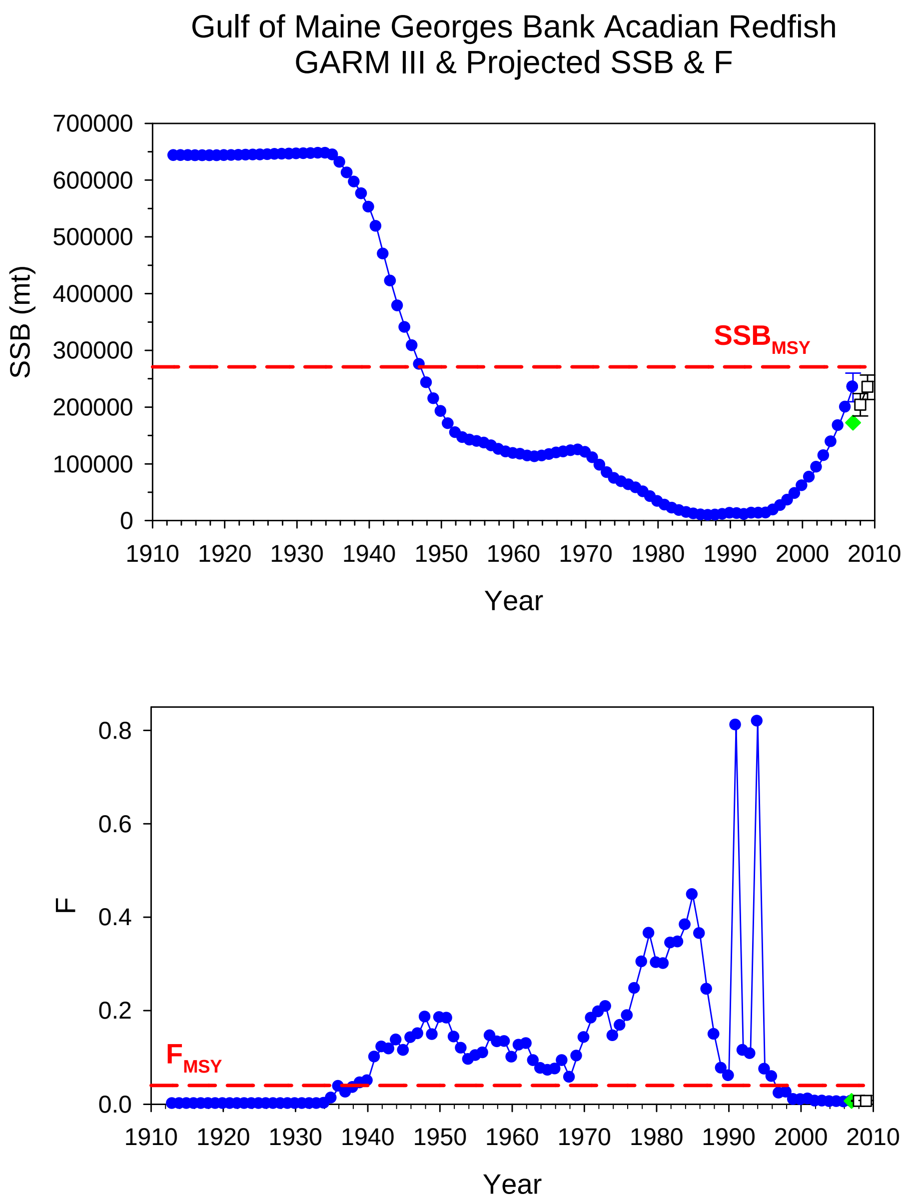
<u>M. Pollock was not overfished and was not experiencing overfishing in 2009.</u> Pollock was assessed at SARC 50 in 2010. SSB has increased from 1990 to 2006. There has been a slight decline in SSB since 2006. No retrospective adjustment was made for pollock.

Figure 20 – Georges Bank/Gulf of Maine pollock spawning stock biomass (SSB) and fishing mortality rate (F) during 1970-2009 reported in SARC 50 along with 80% confidence intervals for 2009 estimates



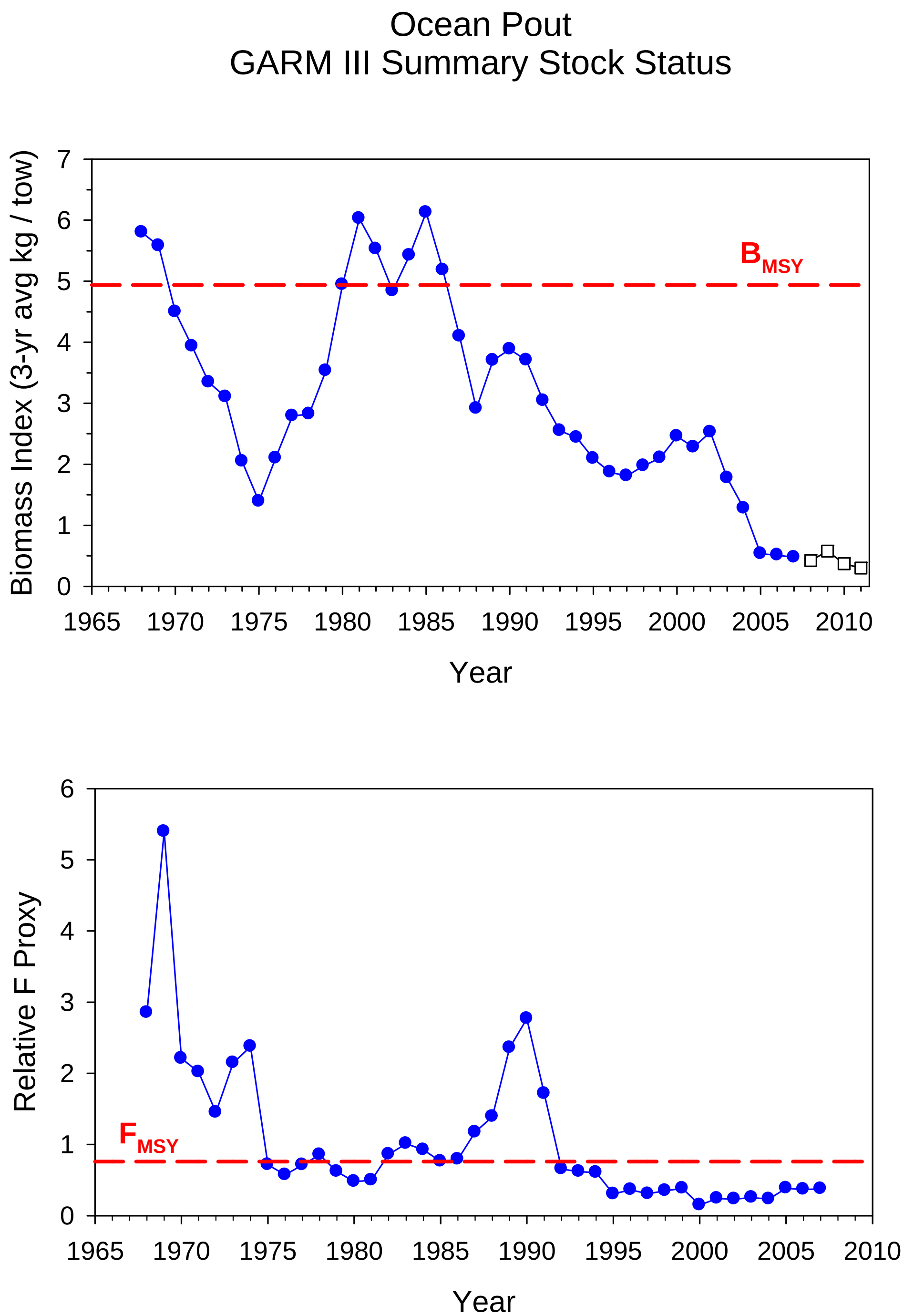
N. Acadian redfish was not overfished and was not experiencing overfishing in 2007. Spawning biomass has increased substantially since the mid-1990s. Fishing mortality has been below F_{msy} since 1997. Terminal year population numbers and fishing mortality were adjusted with Mohn's rho estimates.

Figure 21 – Gulf of Maine/Georges Bank Acadian redfish spawning stock biomass (SSB) and fishing mortality (F) estimates during 1913-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Mohn's rho adjusted SSB and F are shown in the terminal year with a green diamond. Projected SSB and F with 80% confidence intervals are shown with open squares



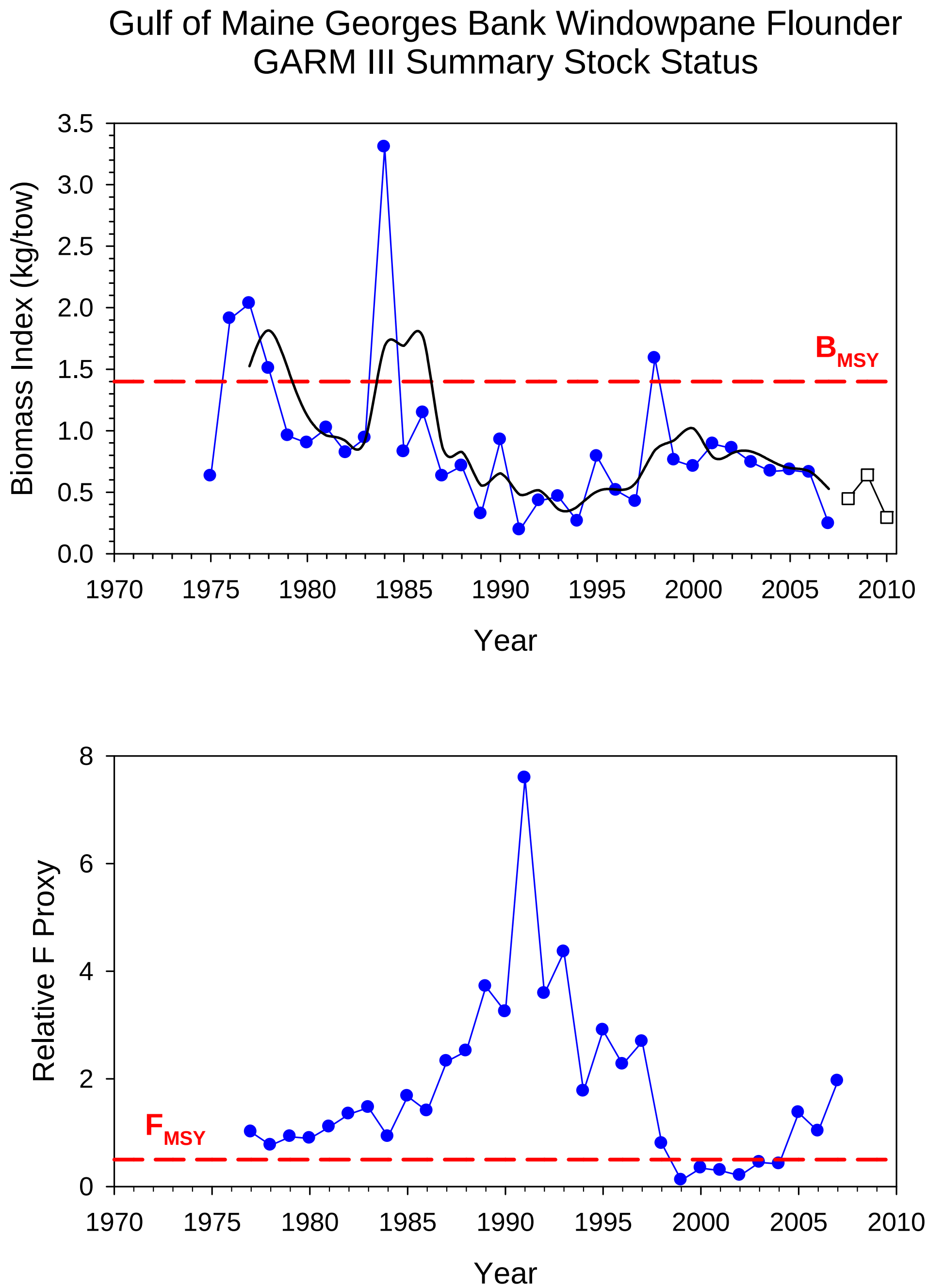
<u>O. Ocean pout was overfished and was not experiencing overfishing in 2007.</u> Biomass has had a decreasing trend since 2002. Fishing mortality has been well below F_{msy} since 1992. There are no signs of stock rebuilding despite that fishing mortality is relatively low.

Figure 22 – Ocean pout centered three year average of the spring biomass index (B) and relative exploitation rate (F) during 1968-2007 reported in GARM III. Updated biomass indices for 2008 to 2011 are also shown with open squares. Surveys done with the Bigelow are converted to Albatross units



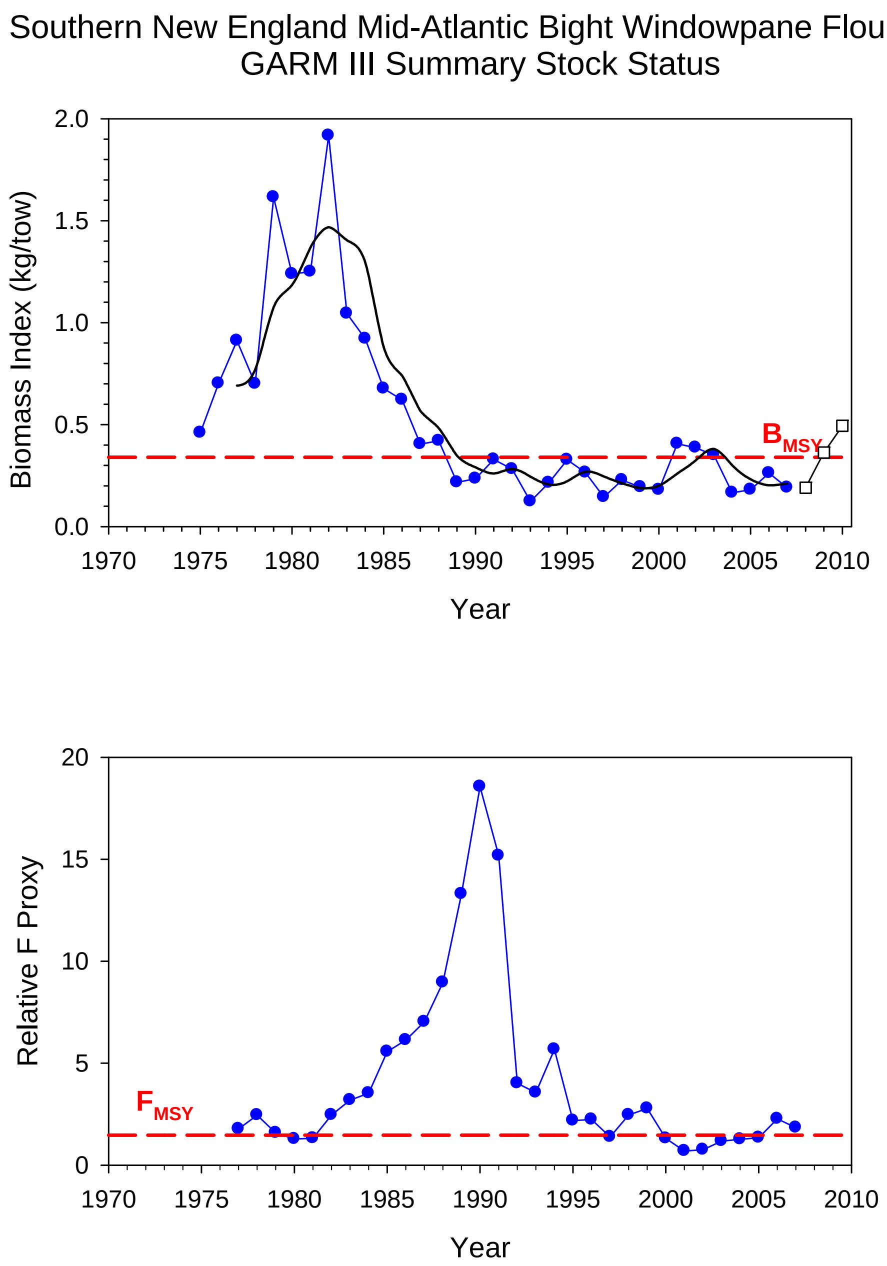
<u>P. Northern windowpane flounder was overfished and was experiencing overfishing in 2007.</u> Biomass has decreased since 2001. Fishing mortality has been increasing since 2002.

Figure 23 – Gulf of Maine/Georges Bank windowpane flounder fall biomass index (B) and relative exploitation rate (F) during 1975-2007 reported in GARM III. Biomass status determination is based on the lagged three year average plotted with a solid black line. Updated biomass indices for 2008 and 2010 are also shown with open squares. Surveys done with the Bigelow are converted to Albatross units



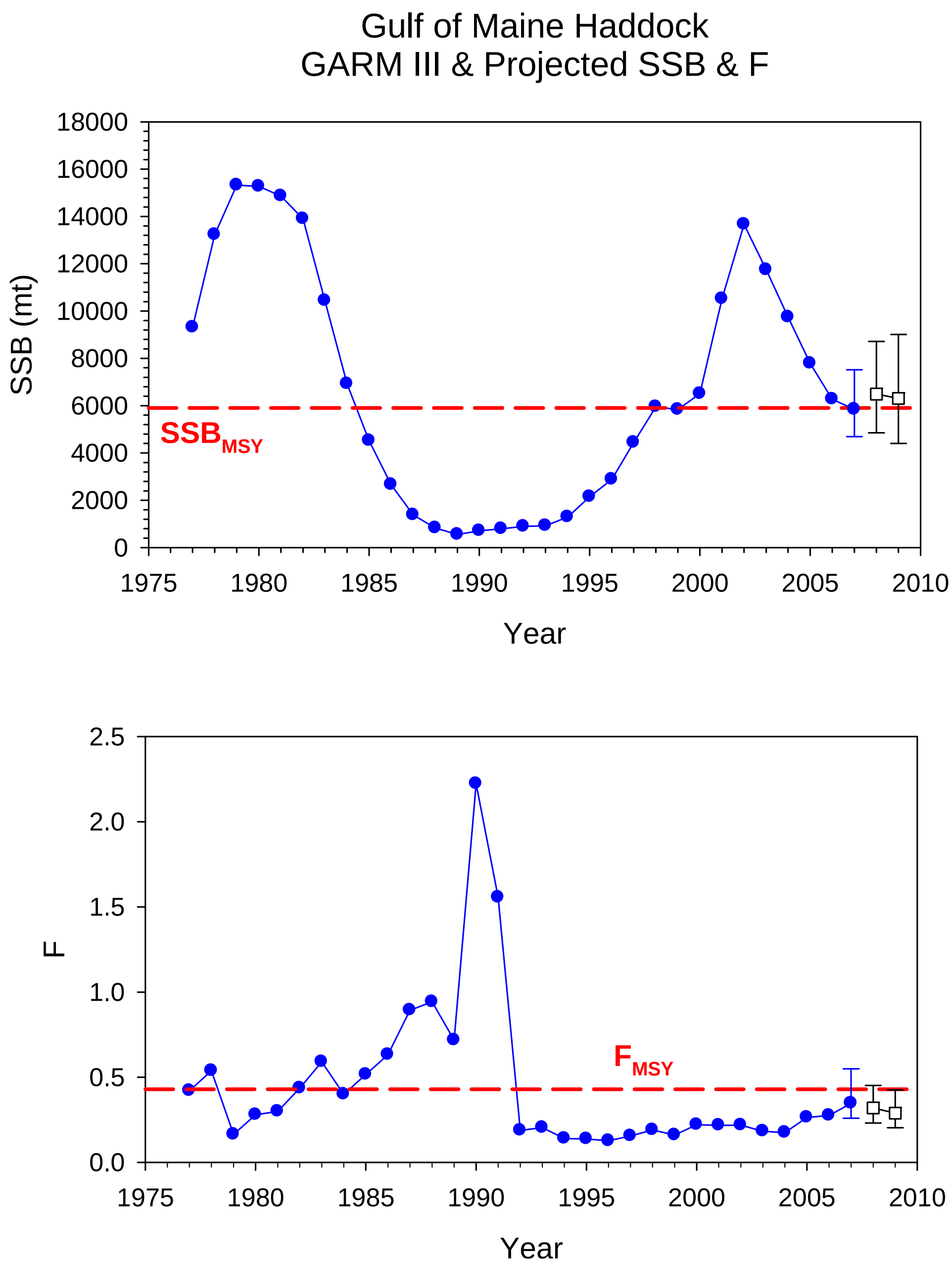
Q. Southern windowpane flounder was not overfished and was experiencing overfishing in 2007. Biomass has been low and fluctuated without trend since the late-1980s. The relative F has increased above F_{msy} in 2006 and 2007.

Figure 24 – Southern New England/Mid-Atlantic windowpane flounder fall biomass index (B) and relative exploitation rate (F) during 1975-2007 reported in GARM III. Biomass status determination is based on the lagged three year average plotted with a solid black line. Updated biomass indices for 2008 and 2010 are also shown with open squares. Surveys done with the Bigelow are converted to Albatross units



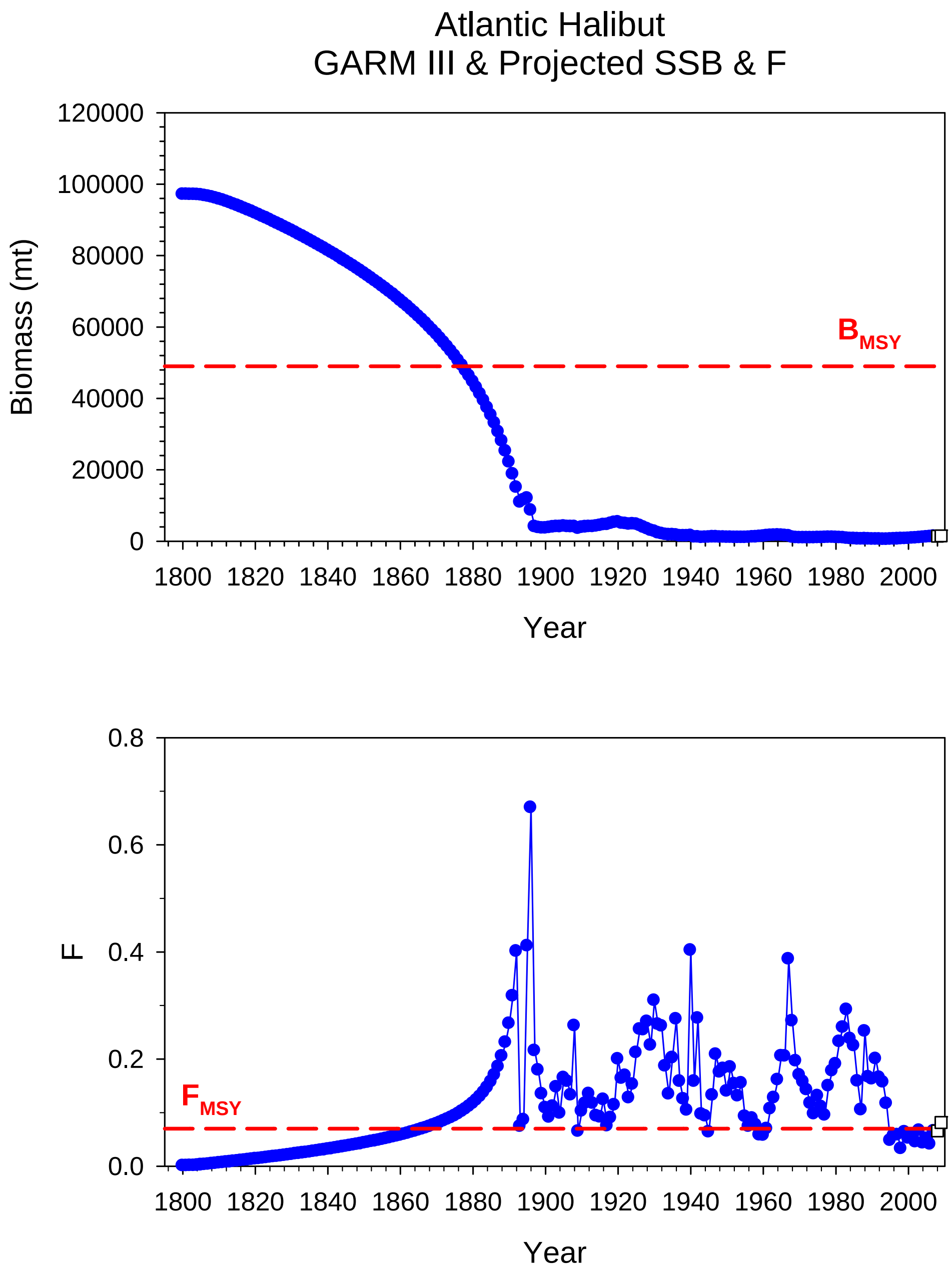
R. Gulf of Maine haddock was not overfished and was not experiencing overfishing in 2007. Spawning biomass increased from 1989 to 2002 and has decreased since then. Fishing mortality has been below F_{msy} since 1992. No retrospective adjustment was made for Gulf of Maine haddock.

Figure 25 – Gulf of Maine haddock spawning stock biomass (SSB) and fishing mortality (F) during 1977-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares



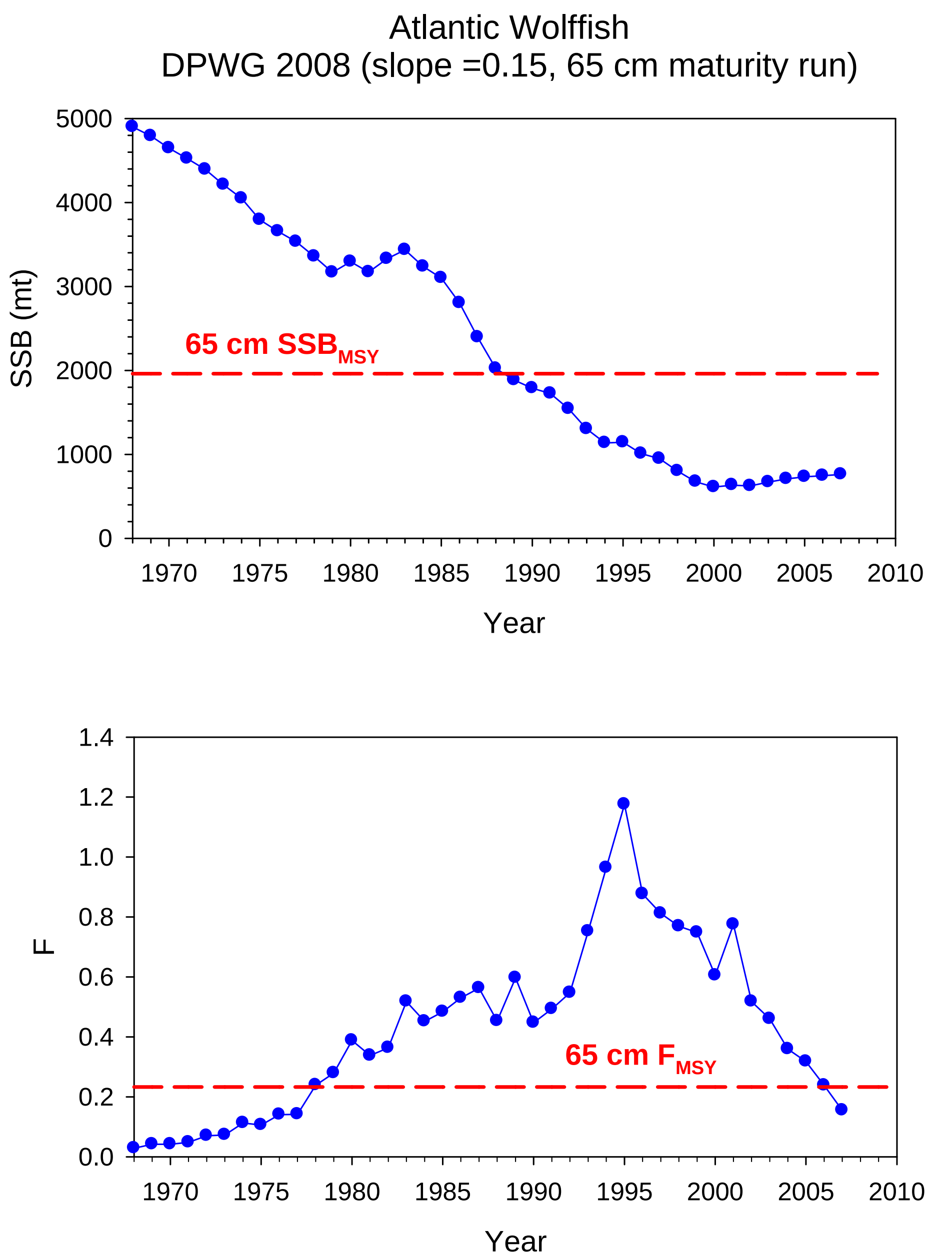
S. Atlantic halibut was overfished and was not experiencing overfishing in 2007. Biomass has been stable and well below B_{msy} since the late 1800s. Fishing mortality has been below F_{msy} since 1995.

Figure 26 – Atlantic halibut biomass (B) and fishing mortality rate (F) during 1800-2007 reported in GARM III (blue circles). Projected SSB and F with 80% confidence intervals are shown with open squares



<u>T. Atlantic wolffish was overfished but the overfishing status was unknown in 2007.</u> Atlantic wolffish was assessed at the Data Poor Working Group (DPWG) in 2008. Spawning stock biomass has been stable but low since the late 1990s. Fishing mortality has been declining since the mid-1990s.

Figure 27 – Atlantic wolffish spawning stock biomass (SSB) and fishing mortality rate (F) during 1968-2007 reported in the DPWG 2008 (blue circles) assuming 65cm knife edge maturity and an assumed selectivity slope equal to 0.15. Overfished status did not change using different assumptions on maturity and selectivity



6.2.1.3 Atlantic Sea Scallops

The Atlantic sea scallop (*Placopecten magellanicus*) is a bivalve mollusk that is distributed along the continental shelf, typically on sand and gravel bottoms from the Gulf of St. Lawrence to North Carolina (Hart and Chute, 2004). The species generally inhabit waters less than 20° C and depths that range from 30-110 m on Georges Bank, 20-80 m in the Mid-Atlantic, and less than 40 m in the near-shore waters of the Gulf of Maine. Although all sea scallops in the US EEZ are managed as a single stock per Amendment 10 to the Atlantic Sea Scallop FMP, four regional components and six resource areas are recognized. Major aggregations occur in the Mid-Atlantic from Virginia to Long Island (Mid-Atlantic component), Georges Bank, the Great South Channel (South Channel component), and the Gulf of Maine (Hart and Rago, 2006; NEFSC, 2007). These four regional components are further divided into six resource areas: Delmarva (Mid-Atlantic), New York Bight (Mid-Atlantic), South Channel, southeast part of Georges Bank, northeast peak and northern part of Georges Bank, and the Gulf of Maine (NEFMC, 2007). Assessments focus on two main parts of the stock and fishery that contain the largest concentrations of sea scallops: Georges Bank and the Mid-Atlantic, which are combined to evaluate the status of the whole stock (NEFMC, 2007). In 2009, sea scallops were not overfished and overfishing was not occurring.

Biomass
The scallop abundance and biomass on Georges Bank increased from 1995-2000 after implementing closures and effort reduction measures. Biomass and abundance then declined from 2006-2008 because of poor recruitment and the reopening of portions of groundfish closed areas. Biomass has increased on Georges Bank in both 2009 and 2010, mainly due to increased growth rates and strong recruitment in the Great South Channel, along with continuing concentrations on the Northern Edge and in the central portion of Closed Area I, especially just south of the “sliver” access area. The highest concentrations of biomass on Georges Bank are currently on the Northern Edge, within Closed Area I, and within the Nantucket Lightship closed area. In general, the 2010 Mid-Atlantic biomass is down from 2009, mainly from the depletion of Elephant Trunk. Figure 2 shows the biomass in the Mid-Atlantic based on the 2010 NMFS scallop survey, with largest densities in the Hudson Canyon and Delmarva closed areas, and notably high biomass in a few areas south of Long Island.

6.3 Other Species

6.3.1 Skates

Table 18 presents the seven species in the northeast region’s skate complex, including each species common name(s), scientific name, size at maturity (total length, TL), and general distribution.

Table 18 - Skate Species Identification for Northeast Complex

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	GENERAL DISTRIBUTION	SIZE AT MATURITY cm (TL)	OTHER COMMON NAMES
Winter Skate	*Leucoraja ocellata*	Inshore and offshore Georges Bank (GB) and Southern New England (SNE) with lesser amounts in Gulf of Maine (GOM) or Mid Atlantic (MA)	Females: 76 cm Males: 73 cm 85 cm	Big Skate Spotted Skate Eyed Skate
Barndoor Skate	*Dipturus laevis*	Offshore GOM (Canadian waters), offshore GB and SNE (very few inshore or in MA region)	Males (GB): 108cm Females (GB): 116 cm	
Thorny Skate	*Amblyraja radiata*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	Males (GOM): 87 cm Females (GOM): 88 cm 84 cm	Starry Skate
Smooth Skate	*Malacoraja senta*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	56 cm	Smooth-tailed Skate Prickly Skate
Little Skate	*Leucoraja erinacea*	Inshore and offshore GB, SNE and MA (very few in GOM)	40-50 cm	Common Skate Summer Skate Hedgehog Skate Tobacco Box Skate
Clearnose Skate	*Raja eglanteria*	Inshore and offshore MA	61 cm	Brier Skate
Rosette Skate	*Leucoraja garmani*	Offshore MA	34 – 44 cm; 46 cm	Leopard Skate

Abbreviations are for Gulf of Maine (GOM), Georges Bank (GB), southern New England (SNE) and the Mid-Atlantic (MA) regions.

The stock status relies entirely on the annual NMFS trawl survey. Except for little skates, the abundance and biomass trends are best represented by the fall survey, which has been updated through 2010. Little skate abundance and biomass trends are best represented by the spring survey, which has been updated through 2011. Details about long term trends in abundance and biomass are given in the SAW 44 Report (NEFSC 2007a) and in the Skate Amendment 3 FEIS. These descriptions are not repeated here.

Benchmark assessment results from SAW 44 are given in NEFSC 2007a and 2007b. Because the analytic models that were attempted did not produce reliable results, the status of skate overfishing is determined based on a rate of change in the three year moving average for survey biomass. These thresholds vary by species due to normal inter-annual survey variability. Details about the overfishing reference points and how they were chosen are given in NEFSC 2000.

The latest results for 2010 (2011 spring survey for little skate) are given in Table 19. At this time, overfishing is not occurring on any skate species.

Table 19 - Summary by species of recent survey indices, survey strata used and biomass reference points. Green cells represent biomass that is above the B_{MSY} proxy (target). Red cells indicate stock biomass is below the threshold and is (or was) considered overfished, or overfishing was occurring.

	BARNDOOR	CLEARNOSE	LITTLE	ROSETTE	SMOOTH	THORNY	WINTER
Survey (kg/tow) Time series basis Strata Set	Autumn 1963 – 1966 Offshore 1 – 30, 33-40	Autumn 1975-1998 Offshore 61-76, Inshore 15-44	Spring 1982-1999 Offshore 1-30, 33-40, 61-76, Inshore 1-66	Autumn 1967-1998 Offshore 61-76	Autumn 1963-1998 Offshore 1-30, 33-40	Autumn 1963-1998 Offshore 1-30, 33-40	Autumn 1967-1998 Offshore 1-30, 33-40, 61-76
1999	0.30	1.05	9.98	0.07	0.07	0.48	5.09
2000	0.29	1.03	8.60	0.03	0.15	0.83	4.38
2001	0.54	1.61	6.84	0.12	0.29	0.33	3.89
2002	0.78	0.89	6.44	0.05	0.11	0.44	5.60
2003	0.55	0.66	6.49	0.03	0.19	0.74	3.39
2004	1.30	0.71	7.22	0.05	0.21	0.71	4.03
2005	1.04	0.52	3.24	0.07	0.13	0.22	2.62
2006	1.17	0.53	3.32	0.06	0.21	0.73	2.48
2007	0.80	0.85	4.46	0.07	0.09	0.32	3.71
2008	1.09	1.73	7.34	0.03	0.10	0.21	9.50
2009 prelim	1.13	0.89	6.55	0.06	0.21	0.25	11.33
2010 prelim	1.10	0.68	10.56	0.03	0.18	0.28	8.09
2005-2007 3-year average	1.00	0.64	3.67	0.06	0.14	0.42	2.93
2006-2008 3-year average	1.02	1.04	5.04	0.05	0.13	0.42	5.23
2007-2009, prelim. 3-year average	1.01	1.16	6.12	0.05	0.13	0.26	8.18
2008-2010, prelim. 3-year average	1.11	1.10	8.15	0.04	0.16	0.25	9.64
Percent change 2006-2008 compared to 2005-2007	2	63	37	-19	-8	-1	78
Percent change 2007-2009 compared to 2006-2008, prelim.	-1	12	21	4	-1	-38	56
Percent change 2008-2010 compared to 2007-2009, prelim.	10	-5	33	-24	23	-5	18
Percent change for overfishing status determination in FMP	-30	-40	-20	-60	-30	-20	-20
Biomass Target	1.570	0.660	6.150	0.048	0.270	4.130	5.660
Biomass Threshold	0.785	0.330	3.075	0.024	0.135	2.065	2.830
CURRENT STATUS	Not Overfished; Not Rebuilt; Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished; Not Rebuilt; Overfishing is Not Occurring	Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring

6.3.2 Monkfish

Life History: Monkfish, *Lophius americanus*, also called goosefish, are distributed in the western North Atlantic from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina. Monkfish may be found from inshore areas to depths of at least 900 m. Seasonal onshore-offshore migrations occur and appear to be related to spawning and possibly to food availability.

Female monkfish begin to mature at age 4, and 50 percent of females are mature by age 5 (about 43 cm). Males mature at slightly younger ages and smaller sizes (50 percent maturity at age 4.2 or 36 cm). Spawning takes place from spring through early autumn, progressing from south to north, with most spawning occurring during the spring and early summer. Females lay a buoyant egg raft or veil which can be as large as 12 m long and 1.5 m wide, and only a few mm thick. The eggs are arranged in a single layer in the veil, and the larvae hatch after about 1 to 3 weeks, depending on water temperature. The larvae and juveniles spend several months in a pelagic phase before settling to a benthic existence at a size of about 8 cm.

Population Management and Status: Monkfish are currently regulated by the Monkfish FMP, which was implemented in 1999 (NEFMC and MAFMC 1998). The FMP was designed to stop overfishing and rebuild the stocks through a number of measures, including: limiting the number of vessels with access to the fishery and allocating DAS to those vessels; setting trip limits for vessels fishing for monkfish; minimum fish size limits; gear restrictions; incidental catch possession limits for vessels not on a monkfish DAS; and a framework adjustment process.

The FMP defines two management areas for monkfish (northern and southern), divided roughly by an east-west line bisecting Georges Bank. Monkfish in both management regions are not overfished and overfishing is not occurring.

6.3.3 Spiny Dogfish

Life History: Spiny dogfish, *Squalus acanthias*, are distributed in the western North Atlantic from Labrador to Florida and are considered to be a unit stock off the coast of New England. In summer, dogfish migrate northward to the Gulf of Maine-Georges Bank region and into Canadian waters and return southward in autumn and winter. Spiny dogfish tend to school by size and, when mature, by sex. The species bears live young, with a gestation period of about 18 to 22 months, and produce between 2 to 15 pups with an average of 6 cm. Size at maturity for females is around 80 cm, but can vary from 78 cm to 85 cm depending on the abundance of females.

Population Management and Status: The fishery is managed under a FMP developed jointly by the NEFMC and Mid Atlantic Fishery Management Council (MAFMC) for federal waters and a plan developed concurrently by the Atlantic States Marine Fisheries Commission for state waters. Spawning stock biomass of spiny dogfish declined rapidly in response to a directed fishery during the 1990s. Management measures, initially implemented in 2001, have been effective in reducing landings and reducing fishing mortality (MAFMC 2009). Overfishing is not presently considered to be occurring. A peer-review of the spiny dogfish stock in April 2010 concluded that the spawning stock biomass had been above the biomass target for two years and in June, the

Councils received a letter from the National Marine Fisheries Service (NMFS) indicating that the spiny dogfish stock was rebuilt. Amendment 3 to the Spiny Dogfish FMP is currently under development. The MAFMC has recommended a 37 million pound quota for the 2012 fishing year for spiny dogfish, based on the allowable biological catch determination of the Council's Scientific and Statistical Committee. This quota represents roughly an 85% increase from the 2010 level.

6.3.4 Summer Flounder (Fluke)

Life History: Summer flounder, *Paralichtys dentatus*, are distributed in the Atlantic Ocean from Nova Scotia to the east coast of Florida and in U.S. waters occur most commonly in the Mid-Atlantic region from Cape Cod, Massachusetts, to Cape Fear, North Carolina.

From winter through early spring, larvae enter estuaries and coastal lagoons and develop into juveniles that bury in the sediment. Juveniles use estuarine marsh creeks, seagrass beds, mud flats, and open bay areas for habitat. Juveniles are most abundant in areas with a predominantly sandy bottom or sand-shell substrate, or where there is a transition from fine sand to silt and clay. Adults spend most of their life on or near the sea bottom burrowing in the sandy substrate. They can also be found in marsh creeks, sea grass beds, and sand flats. Females live to at least 14 years and can grow up to about 36 inches, and males live to 12 years and can grow up to about 25 inches. At age 2 or 3, at a length of about 10 inches, summer flounder reach reproductive maturity. They spawn in the fall and early winter, when they move offshore to open ocean areas of the continental shelf. Larval and juvenile summer flounder are preyed upon by many species including spiny dogfish, monkfish, cod, and silver hake.

Population Management and Status: The fishery is managed under a FMP developed jointly by the Mid Atlantic Fishery Management Council (MAFMC) for federal waters and a plan developed concurrently by the Atlantic States Marine Fisheries Commission for state waters. Strict management measures, including seasons, quotas, and minimum size limits, are being used to meet rebuilding targets for the stock. A “Total Allowable Landings” program is in place to manage the stock that allocates landings into an annual commercial quota (60%) and recreational harvest limit (40%). The commercial allocation is further distributed among the states based on their share of commercial landings during the 1980s.

The summer flounder stock is rebuilding and is expected to be fully rebuilt by 2013. Overfishing is not occurring and the stock is no longer considered overfished. Summer flounder biomass was estimated to be 89% of its target level in 2009.

6.4 Protected Resources

There are numerous protected species that inhabit the environment within the Northeast Multispecies FMP management unit, and that, therefore, potentially occur in the operations area of the fishery. These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act of 1973 (ESA; i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA), and are under NMFS' jurisdiction. As listed below, 17 marine mammal, sea turtle, and fish species are classified as endangered, threatened, candidate, or proposed under the ESA; 3 others are candidate species under the ESA; and the remaining species listed below are protected by the MMPA and are known to interact with the multispecies fishery in the northeast.

6.4.1 Species Present in the Area

Table 20 lists the species, protected either by the ESA, the MMPA, or both, that may be found in the environment that would be utilized by the fishery. Table 20 also includes three candidate fish species as identified under the ESA. Candidate species are those petitioned species that NMFS is actively considering for listing as endangered or threatened under the ESA, as well as those species for which NMFS has initiated an ESA status review that it has announced in the Federal Register.

Table 20 – Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery

Species	Status
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted dolphin (*Stenella frontalis*)	Protected
Bottlenose dolphin (*Tursiops truncatus*)[b]	Protected
Harbor porpoise (*Phocoena phocoena*)	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered[c]
Loggerhead sea turtle (*Caretta caretta*)	
Northwest Atlantic DPS	Threatened
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered

Table 20 (continued) Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery.

Species	Status
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Atlantic sturgeon *(Acipenser oxyrinchus)*	
Gulf of Maine DPS	Threatened
New York Bight DPS	Endangered
Chesapeake Bay DPS	Endangered
Carolina DPS	Endangered
South Atlantic DPS	Endangered
Cusk *(Brosme brosme)*	Candidate
Alewife (*Alosa pseudoharengus*)	Candidate
Blueback Herring (*Alosa aestivalis*)	Candidate
Pinnipeds	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Pagophilus groenlandicus*)	Protected
Hooded seal (*Cystophora cristata*)	Protected

Note:

[a] MMPA-listed species occurring on this list are only those species that have a history of interaction with similar gear types within the action area of the Northeast Multispecies Fishery, as defined in the 2012 List of Fisheries.

[b] Bottlenose dolphin (*Tursiops truncatus*), Western North Atlantic coastal stock is listed as depleted.

[c] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

A status review for Atlantic sturgeon was completed in 2007 which indicated that five Distinct Population Segments (DPS) of Atlantic sturgeon exist in the United States (ASSRT 2007). On October 6, 2010, NMFS proposed listing these five DPSs of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species (75 FR 61872 and 75 FR 61904). Final rules listing the five DPSs of Atlantic sturgeon were published in the Federal Register on February 6, 2012 (77 FR 5880 and 75 FR 5914). The Gulf of Maine DPS of Atlantic sturgeon is listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are listed as endangered. Atlantic sturgeon from any of the five DPSs could occur in areas where the multispecies fishery operates. Atlantic sturgeon have been captured in small mesh otter trawl gear, albeit less often than in large mesh otter trawl gear (Stein et al. 2004a, ASMFC 2007).

Candidate species receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed project. NMFS has initiated review of recent stock assessments, bycatch information, and other information for these candidate and proposed species. The results of those efforts are needed to accurately characterize recent interactions between fisheries and the candidate/proposed species in the context of stock sizes. Any conservation measures deemed appropriate for these species will follow the information reviews. Please note that once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10).

6.4.2 Species Potentially Affected

It is expected that the sea turtle, cetacean, and pinniped species discussed below have the potential to be affected by the operation of the multispecies fishery. Background information on the range-wide status of sea turtle and marine mammal species that occur in the area and are known or suspected of interacting with fishing gear (demersal gear including trawls, gillnets, and longline types) can be found in a number of published documents. These documents include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Turtle Expert Working Group 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b, recovery plans for ESA-listed cetaceans and sea turtles (NMFS 1991, 2005; NMFS and USFWS 1991a, 1991b; NMFS and USFWS 1992), the marine mammal stock assessment reports (e.g., Waring et al. 1995-2011), and other publications (e.g., Clapham et al. 1999, Perry et al. 1999, Best et al. 2001, Perrin et al. 2002).

Additional ESA background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent sea turtle status reviews and biological reports (NMFS and USFWS 1995, TEWG 2000, NMFS SEFSC 2001, NMFS and USFWS 2007a), loggerhead recovery team report (NMFS and USFWS 2008), status reviews and stock assessments, Recovery Plans for the humpback whale (NMFS 1991), right whale (NMFS 1991, NMFS 2005), fin and sei whale (NMFS 1998), fin whale (NMFS 2010) and the marine mammal stock assessment report (Waring et al. 2011) and other publications (e.g., Perry et al. 1999; Clapham et al. 1999; IWC 2001).

6.4.2.1 Sea Turtles

Loggerhead, leatherback, Kemp’s ridley, and green sea turtles occur seasonally in southern New England and Mid-Atlantic continental shelf waters north of Cape Hatteras, North Carolina. Turtles generally move up the coast from southern wintering areas as water temperatures warm in the spring (James et al. 2005, Morreale and Standora 2005, Braun-McNeill and Epperly 2004, Morreale and Standora 1998, Musick and Limpus 1997, Shoop and Kenney 1992, Keinath et al. 1987). A reversal of this trend occurs in the fall when water temperatures cool. Turtles pass Cape Hatteras by December and return to more southern waters for the winter (James et al. 2005, Morreale and Standora 2005, Braun-McNeill and Epperly 2004, Morreale and Standora 1998, Musick and Limpus 1997, Shoop and Kenney 1992, Keinath et al. 1987). Hard-shelled species typically occur as far north as Cape Cod whereas the more cold-tolerant leatherbacks occur in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992, STSSN database http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp).

On March 16, 2010, NMFS and USFWS published a proposed rule (75 FR 12598) to divide the worldwide population of loggerhead sea turtles into nine DPSs, as described in the 2009 Status

Review. Two of the DPSs were proposed to be listed as threatened and seven of the DPSs, including the Northwest Atlantic Ocean DPS, were proposed to be listed as endangered. NMFS and the USFWS accepted comments on the proposed rule through September 13, 2010 (75 FR 30769, June 2, 2010). On March 22, 2011 (76 FR 15932), NMFS and USFWS extended the date by which a final determination on the listing action will be made to no later than September 16, 2011. This action was taken to address the interpretation of the existing data on status and trends and its relevance to the assessment of risk of extinction for the Northwest Atlantic Ocean DPS, as well as the magnitude and immediacy of the fisheries bycatch threat and measures to reduce this threat. New information or analyses to help clarify these issues were requested by April 11, 2011.

On September 22, 2011, NMFS and USFWS issued a final rule (76 FR 58868), determining that the loggerhead sea turtle is composed of nine DPSs (as defined in Conant et al., 2009) that constitute species that may be listed as threatened or endangered under the ESA. Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea), and four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean). Note that the Northwest Atlantic Ocean (NWA) DPS and the Southeast Indo-Pacific Ocean DPS were original proposed as endangered. The NWA DPS was determined to be threatened based on review of nesting data available after the proposed rule was published, information provided in public comments on the proposed rule, and further discussions within the agencies. The two primary factors considered were population abundance and population trend. NMFS and USFWS found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats.

The September 2011 final rule also noted that critical habitat for the two DPSs occurring within the U.S. (NWA DPS and North Pacific DPS) will be designated in a future rulemaking. Information from the public related to the identification of critical habitat, essential physical or biological features for this species, and other relevant impacts of a critical habitat designation was solicited.

The Preferred Alternatives in this document only occur in the Atlantic Ocean. As noted in Conant et al. (2009), the range of the four DPSs occurring in the Atlantic Ocean are as follows: NWA DPS – north of the equator, south of 60° N latitude, and west of 40° W longitude; Northeast Atlantic Ocean (NEA) DPS – north of the equator, south of 60° N latitude, east of 40° W longitude, and west of 5° 36’ W longitude; South Atlantic DPS – south of the equator, north of 60° S latitude, west of 20° E longitude, and east of 60° W longitude; Mediterranean DPS – the Mediterranean Sea east of 5° 36’ W longitude. These boundaries were determined based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies. Sea turtles from the NEA DPS are not expected to be present over the North American continental shelf in U.S. coastal waters, where the Preferred Alternatives occur (P. Dutton, NMFS, personal communication, 2011). Previous literature (Bowen et al. 2004) has suggested that there is the potential, albeit small, for some juveniles from the Mediterranean DPS to be present in U.S. Atlantic coastal foraging grounds. These data should be interpreted with caution however, as they may be representing a shared common haplotype and lack of representative sampling at Eastern Atlantic rookeries. Given that updated, more refined analyses are ongoing and the occurrence of Mediterranean DPS juveniles in U.S. coastal waters is rare and uncertain, if even occurring at all, for the purposes of this assessment we are making the determination that the Mediterranean DPS is not likely to be present in the action area. Sea turtles of the South Atlantic DPS do not inhabit the action area of this subject fishery (Conant et al. 2009). As such, the remainder of this assessment will only focus on the NWA DPS of loggerhead sea turtles, listed as threatened.

In general, sea turtles are a long-lived species and reach sexual maturity relatively late (NMFS SEFSC 2001; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Sea turtles are injured and killed by numerous human activities (NRC 1990; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Nest count data are a valuable source of information for each turtle species since the number of nests laid reflects the reproductive output of the nesting group each year. A decline in the annual nest counts has been measured or suggested for four of five western Atlantic loggerhead nesting groups through 2004 (NMFS and USFWS 2007a), however, data collected since 2004 suggests nest counts have stabilized or increased (TEWG 2009). Nest counts for Kemp’s ridley sea turtles as well as leatherback and green sea turtles in the Atlantic demonstrate increased nesting by these species (NMFS and USFWS 2007b, 2007c, 2007d).

6.4.2.2 Large Cetaceans

The most recent Marine Mammal Stock Assessment Report (SAR) (Waring et al. 2010) reviewed the current population trend for each of these cetacean species within U.S. EEZ waters, as well as providing information on the estimated annual human-caused mortality and serious injury, and a description of the commercial fisheries that interact with each stock in the U.S. Atlantic. Information from the SAR is summarized below.

The western North Atlantic baleen whale species (North Atlantic right, humpback, fin, sei, and minke) follow a general annual pattern of migration from high latitude summer foraging grounds, including the Gulf and Maine and Georges Bank, to low latitude winter calving grounds (Perry et al. 1999, Kenney 2002). However, this is an oversimplification of species movements, and the complete winter distribution of most species is unclear (Perry et al. 1999, Waring et al. 2011). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle et al. 1993, Wiley et al. 1995, Perry et al. 1999, Brown et al. 2002). Blue whales are most often sighted on the east coast of Canada, particularly in the Gulf of St. Lawrence, and occurs only infrequently within the U.S. EEZ (Waring et al. 2002).

Available information suggests that the North Atlantic right whale population increased at a rate of 1.8 percent per year between 1990 and 2005. The total number of North Atlantic right whales is estimated to be at least 361 animals in 2005 (Waring et al. 2011). The minimum rate of annual human-caused mortality and serious injury to right whales averaged 2.8 mortality or serious injury incidents per year during 2004 to 2008 (Waring et al. 2011). Of these, fishery interactions resulted in an average of 0.8 mortality or serious injury incidents per year.

The North Atlantic population of humpback whales is conservatively estimated to be 7,698 (Waring et al. 2011). The best estimate for the GOM stock of humpback whale population is 847 whales (Waring et al. 2011). Based on data available for selected areas and time periods, the minimum population estimates for other western North Atlantic whale stocks are 3,269 fin whales, 208 sei whales (Nova Scotia stock), 3,539 sperm whales, and 6,909 minke whales (Waring et al. 2009). Current data suggest that the Gulf of Maine humpback whale stock is steadily increasing in size (Waring 2011). Insufficient information exists to determine trends for these other large whale species.

Recent revisions to the Atlantic Large Whale Take Reduction Plan (ALWTRP) (72 FR 57104, October 5, 2007) continue to address entanglement risk of large whales (right, humpback, and fin whales, and acknowledge benefits to minke whales) in commercial fishing gear. The revisions seek to reduce the risk of death and serious injury from entanglements that do occur.

6.4.2.3 Small Cetaceans

There is anthropogenic mortality of numerous small cetacean species (dolphins, pilot whales, and harbor porpoise) in Northeast multispecies fishing gear. Seasonal abundance and distribution of each species off the coast of the Northeast U.S. varies with respect to life history characteristics. Some species such as white-sided dolphin and harbor porpoise primarily occupy continental shelf waters. Other species such as the Risso's dolphin occur primarily in continental shelf edge and slope waters. Still other species like the common dolphin and the spotted dolphin occupy all three habitats. Waring et al. (2011) summarizes information on the western North Atlantic stocks of each species.

6.4.2.4 Pinnipeds

Of the four species of seals expected to occur in the area, harbor seals have the most extensive distribution with sightings occurring as far south as 30° N (Katona et al. 1993, Waring et al. 2011). Gray seals are the second most common seal species in U.S. EEZ waters, occurring primarily in New England (Katona et al. 1993; Waring et al. 2011). Pupping for both species occurs in both U.S. and Canadian waters of the western North Atlantic with the majority of harbor seal pupping likely occurring in U.S. waters and the majority of gray seal pupping in Canadian waters, although there are at least three gray seal pupping colonies in U.S. waters as well. Harp and hooded seals are less commonly observed in U.S. EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring, and then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch information (Waring et al. 2011).

6.4.2.1 Atlantic Sturgeon

Atlantic sturgeon is an anadromous species that spawns in relatively low salinity, river environments, but spends most of its life in the marine and estuarine environments from Labrador, Canada to the Saint Johns River, Florida (Holland and Yelverton 1973, Dovel and Berggen 1983, Waldman et al. 1996, Kynard and Horgan 2002, Dadswell 2006, ASSRT 2007). Tracking and tagging studies have shown that subadult and adult Atlantic sturgeon that originate from different rivers mix within the marine environment, utilizing ocean and estuarine waters for life functions such as foraging and overwintering (Stein et al. 2004a, Dadswell 2006, ASSRT 2007, Laney et al. 2007, Dunton et al. 2010). Fishery-dependent data as well as fishery-independent data demonstrate that Atlantic sturgeon use relatively shallow inshore areas of the continental shelf; primarily waters less than 50 m (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). The data also suggest regional differences in Atlantic sturgeon depth distribution with sturgeon observed in waters primarily less than 20 m in the Mid-Atlantic Bight and in deeper waters in the Gulf of Maine (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). Information on population sizes for each Atlantic sturgeon DPS is very limited. Based on the best available information, NMFS has concluded that bycatch, vessel strikes, water quality and water availability, dams, lack of regulatory mechanisms for protecting the fish, and dredging are the most significant threats to Atlantic sturgeon.

Comprehensive information on current abundance of Atlantic sturgeon is lacking for all of the spawning rivers (ASSRT 2007). Based on data through 1998, an estimate of 863 spawning adults per year was developed for the Hudson River (Kahnle et al. 2007), and an estimate of 343 spawning adults per year is available for the Altamaha River, GA, based on data collected in 2004-2005 (Schueller and Peterson 2006). Data collected from the Hudson River and Altamaha River studies cannot be used to estimate the total number of adults in either subpopulation, since mature Atlantic sturgeon may not spawn every year, and it is unclear to what extent mature fish in a non-spawning condition occur on the spawning grounds. Nevertheless, since the Hudson and Altamaha Rivers are presumed to have the healthiest Atlantic sturgeon subpopulations within the United States, other U.S. subpopulations are predicted to have fewer spawning adults than either the Hudson or the Altamaha (ASSRT 2007). It is also important to note that the estimates above represent only a fraction of the total population size as spawning adults comprise only a portion of the total population (e.g., this estimate does not include subadults and early life stages)

6.4.3 Species Not Likely to be Affected

It is likely that the actions being considered are not likely to adversely affect shortnose sturgeon, the Gulf of Maine distinct population segment (DPS) of Atlantic salmon, hawksbill sea turtles, blue whales, or sperm whales, all of which are listed as endangered species under the ESA. Further, the actions considered in this document are not likely to adversely affect North Atlantic right whale critical habitat. The following discussion provides the rationale for these suppositions. Although there are additional species that may occur in the operations area that are not known to interact with the specific gear types that would be used by the groundfish fleet, impacts to these species are still considered due to their range and similarity of behaviors to species that have been adversely affected.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. Shortnose sturgeon can be found in rivers along the western Atlantic coast from St. Johns River, Florida (although the species is possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (i.e., south of Chesapeake Bay), while some northern populations are amphidromous (NMFS 1998). Since the groundfish fishery would not operate in or near the rivers where concentrations of shortnose sturgeon are most likely found, it is highly unlikely that the fishery would affect shortnose sturgeon.

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River. Juvenile salmon in New England rivers typically migrate to sea in spring after a one- to three-year period of development in freshwater streams. They remain at sea for two winters before returning to their U.S. natal rivers to spawn (Kocik and Sheehan 2006). Results from a 2001-2003 post-smolt trawl survey in the nearshore waters of the Gulf of Maine indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid to late May (Lacroix, Knox, and Stokesbury 2005). Therefore, commercial fisheries deploying small-mesh active gear (pelagic trawls and purse seines within 10 m of the surface) in nearshore waters of the Gulf of Maine may have the potential to incidentally take smolts. However, it is highly unlikely that the actions being considered will affect the Gulf of Maine DPS of Atlantic salmon given that operation of the multispecies fishery does not occur in or near the rivers where concentrations of Atlantic salmon are likely to be found. Additionally, multispecies gear operates in the ocean at or near the bottom rather than near the surface where Atlantic salmon are likely to occur. Thus, this species will not be considered further in this document.

North Atlantic right whales occur in coastal and shelf waters in the western North Atlantic (NMFS 2005). The western North Atlantic population in the U.S. primarily ranges from winter calving and nursery areas in coastal waters off the southeastern U.S. to summer feeding grounds in New England waters (NMFS 2005). North Atlantic Right Whales use five well-known habitats annually, including multiple in northern waters. These northern areas include the Great South Channel (east of Cape Cod); Cape Cod and Massachusetts Bays; the Bay of Fundy; and Browns and Baccaro Banks, south of Nova Scotia. NMFS designated the Great South Channel and Cape Cod and Massachusetts Bays as Northern Atlantic right whale critical habitat in June 1994 (59 FR 28793). NMFS has designated additional critical habitat in the southeastern U.S. Multispecies gear operates in the ocean at or near the bottom rather than near the surface. It is not known whether the bottom-trawl, or any other type of fishing gear, has an impact on the habitat of the Northern right whale (59 FR 28793).

The hawksbill turtle is uncommon in the waters of the continental U.S. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. There are accounts of hawksbills in south Florida and individuals have been sighted along the east coast as far north as Massachusetts; however, east coast sightings north of Florida are rare (NMFS 2009a). Since operation of the multispecies fishery would not occur in waters that are typically used by hawksbill sea turtles, it is highly unlikely that its operations would affect this turtle species.

Blue whales do not regularly occur in waters of the U.S. EEZ (Waring et al. 2002). In the North Atlantic region, blue whales are most frequently sighted from April to January (Sears 2002). No blue whales were observed during the Cetacean and Turtle Assessment Program (CeTAP) surveys of the mid- and north Atlantic areas of the outer continental shelf (CeTAP 1982). Calving for the species occurs in low latitude waters outside of the area where the groundfish fishery operates. Blue whales feed on euphausiids (krill) that are too small to be captured in fishing gear. There were no observed fishery-related mortalities or serious injuries to blue whales between 1996 and 2000 (Waring et al. 2002). Given that the species is unlikely to occur in areas where the groundfish fishery operates, and given that the operation of the fishery would not affect the availability of blue whale prey or areas where calving and nursing of young occurs, the Preferred Alternative actions would not be likely to adversely affect blue whales.

Unlike blue whales, sperm whales do regularly occur in waters of the US EEZ. However, the distribution of the sperm whales in the US EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2007). Sperm whale distribution is typically concentrated east-northeast of Cape Hatteras in winter and shifts northward in spring when whales are found throughout the Mid-Atlantic Bight (Waring et al. 2006). Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring et al. 1999). In contrast, the multispecies fishery would operate in continental shelf waters. The average depth of sperm whale sightings observed during the CeTAP surveys was 1792 m (CeTAP 1982). Female sperm whales and young males almost always inhabit open ocean, deep water habitat with bottom depths greater than 3,280 ft (1,000 m) and at latitudes less than 40° N (Whitehead 2002). Sperm whales feed on large squid and fish that inhabit the deeper ocean regions (Perrin et al. 2002). Given that sperm whales are unlikely to occur in areas (based on water depth) where the groundfish fishery would operate, and given that the operation of the fishery would not affect the availability of sperm whale prey or areas where calving and nursing of young occurs, the Preferred Alternatives would not be likely to adversely affect sperm whales.

Although large whales and marine turtles may be potentially affected through interactions with fishing gear, it is likely that the continued authorization of the multispecies fishery should not have any adverse effects on the availability of prey for these species. Right whales and sei whales feed on copepods (Horwood 2002, Kenney 2002). The multispecies fishery would not affect the availability of copepods for foraging right and sei whales because copepods are very small organisms that would pass through multispecies fishing gear rather than being captured in it. Humpback whales and fin whales also feed on krill as well as small schooling fish (e.g., sand lance, herring, mackerel) (Aguilar 2002, Clapham 2002). Multispecies fishing gear operates on or very near the bottom. Fish species caught in multispecies gear are species that live in benthic habitat (on or very near the bottom) such as flounders versus schooling fish such as herring and mackerel that occur within the water column. Therefore, the continued authorization of the multispecies fishery, or the approval of FW 47, will not affect the availability of prey for foraging humpback or fin whales. Moreover, none of the turtle species are known to feed upon groundfish.

6.4.4 Interactions between Gear and Protected Resources

Commercial fisheries are categorized by NMFS based on a two-tiered, stock-specific fishery classification system that addresses both the total impact of all fisheries on each marine mammal stock as well as the impact of individual fisheries on each stock. The system is based on the numbers of animals per year that incur incidental mortality or serious injury due to commercial fishing operations relative to a stock's Potential Biological Removal (PBR) level (the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population). Tier 1 takes into account the cumulative mortality and serious injury to marine mammals caused by commercial fisheries while Tier 2 considers marine mammal mortality caused by the individual fisheries; Tier 2 classifications are used in this document to indicate how each type of gear proposed for use in the Preferred Alternatives may affect marine mammals. Table 21 identifies the classifications used in the List of Fisheries (LOF) for FY 2012 (50 CFR 229), which are broken down into Tier 2 Categories I, II, and III.

Table 21 – Descriptions of the Tier 2 Fishery Classification Categories

Category	Category Description
Category I	A commercial fishery that has frequent incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is, by itself, responsible for the annual removal of 50 percent or more of any stock's potential biological removal (PBR) level.
Category II	A commercial fishery that has occasional incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that, collectively with other fisheries, is responsible for the annual removal of more than 10 percent of any marine mammal stock's PBR level and that is by itself responsible for the annual removal of between 1 percent and 50 percent, exclusive of any stock's PBR.
Category III	A commercial fishery that has a remote likelihood of, or no known incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that collectively with other fisheries is responsible for the annual removal of: a. Less than 50 percent of any marine mammal stock's PBR level, or b. More than 1 percent of any marine mammal stock's PBR level, yet that fishery by itself is responsible for the annual removal of 1 percent or less of that stock's PBR level. In the absence of reliable information indicating the frequency of incidental mortality and serious injury of marine mammals by a commercial fishery, the Assistant Administrator would determine whether the incidental serious injury or mortality is "remote" by evaluating other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, qualitative data from logbooks or fisher reports, stranding data, and the species and distribution of marine mammals in the area or at the discretion of the Assistant Administrator.

Interactions between gear and a given species occur when fishing gear overlaps both spatially and trophically with the species' niche. Spatial interactions are more "passive" and involve unintentional interactions with fishing gear. Trophic interactions are more "active" and occur when protected species attempt to consume prey caught in fishing gear and become entangled in the process. Spatial and trophic interactions can occur with various types of fishing gear used by the multispecies fishery through the year. Many large and small cetaceans and sea turtles are more prevalent within the operations area during the spring and summer, although they are also relatively abundant during the fall and would have a higher potential for interaction with groundfish and herring vessels during these seasons. Although harbor seals may be more likely to occur in the operations area between fall and spring, harbor and gray seals are year-round residents; therefore, interactions could occur year-round. The uncommon occurrences of hooded and harp seals in the operations area are more likely to occur during the winter and spring, allowing for an increased potential for interactions during these seasons. Although interactions between protected species and gear deployed by the Northeast multispecies fishery would vary, interactions generally include:

- becoming caught on hooks (bottom longlines)
- entanglement in mesh (gillnets and trawls)
- entanglement in the float line (gillnets and trawls)
- entanglement in the groundline (gillnets, trawls, and bottom longlines)
- entanglement in anchor lines (gillnets and bottom longlines), or

- entanglement in the vertical lines that connect gear to the surface and surface systems (gillnets, traps/pots, and bottom longlines).

NMFS assumes the potential for entanglements to occur is higher in areas where more gear is set and in areas with higher concentrations of protected species.

Table 22 lists the marine mammals known to have had interactions with gear used by the Northeast multispecies fishery. This gear includes sink gillnets, traps/pots, bottom trawls, and bottom longlines within the Northeast multispecies region, as excerpted from the List of Fisheries for FY 2012 ([75 FR 73912; November 29, 2011], also see Waring et al. 2011). Sink gillnets have the greatest potential for interaction with protected resources, followed by bottom trawls. There are no observed reports of interactions between longline gear and marine mammals in FY 2009 and FY 2010. However, interactions between the pelagic longline fishery and both pilot whales and Risso's dolphins led to the development of the Pelagic Longline Take Reduction Plan.

Table 22 – Marine mammals impacts based on groundfishing gear and Northeast Multispecies fishing areas (based on 2011 List of Fisheries)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	Type		
Tier 2, Category I	Mid-Atlantic gillnet	6,402	Bottlenose dolphin, Northern Migratory costal Bottlenose dolphin, Southern Migratory costal Bottlenose dolphin, Northern NC estuarine system Bottlenose dolphin, Southern NC estuarine system Bottlenose dolphin, WNA, offshore Common dolphin, WNA Gray seal, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Humpback whale, Gulf of Maine Long-finned pilot whale, WNA Minke whale, Canadian East Coast Short-finned pilot whale, WNA White-sided dolphin, WNA
Tier 2, Category I	Northeast sink gillnet	3,828	Bottlenose dolphin, WNA, offshore Common dolphin, WNA Fin whale, WNA Gray seal, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Hooded seal, WNA Humpback whale, Gulf of Maine Minke whale, Canadian east coast North Atlantic right whale, WNA Risso's dolphin, WNA White-sided dolphin, WNA

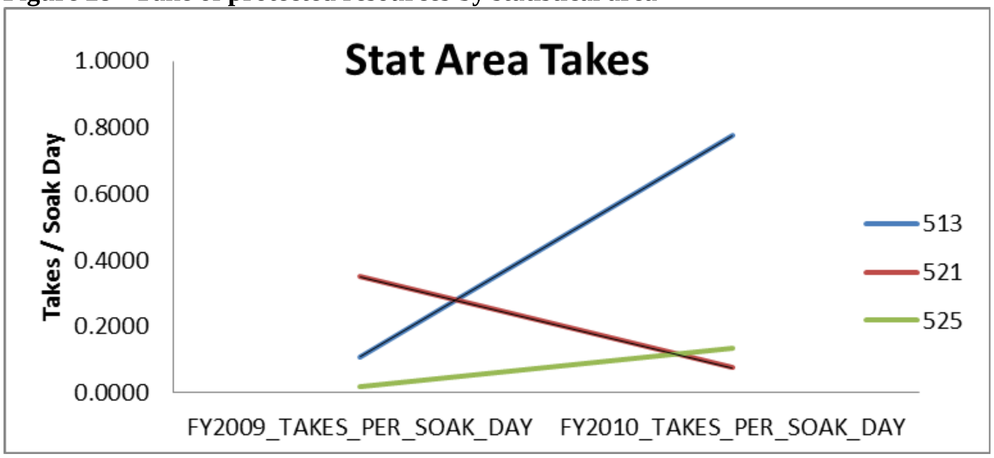
Table 22 Continued – Marine mammals impacts based on groundfishing gear and Northeast multispecies fishing areas (based on 2011 List of Fisheries)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	**Type**		
Tier 2, Category II	Mid-Atlantic bottom trawl	1,388	Bottlenose dolphin, WNA offshore Common dolphin, WNA Harbor seal, WNA Long-finned pilot whale, WNA Risso's dolphin, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
	Northeast bottom trawl	2,584	Bottlenose dolphin, WNA offshore Common dolphin, WNA Grey seal, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Long-finned pilot whale, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
	Atlantic mixed species trap/pot	3,526	Fin whale, WNA Humpback whale, Gulf of Maine
Tier 2, Category III	Northeast/Mid-Atlantic bottom longline/hook-and-line	>1,281	None documented in the most recent 5 years of data

Marine mammals are taken in gillnets, trawls, and trap/pot gear used in the Northeast multispecies area. Documented protected species interactions in Northeast sink gillnet fisheries include harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, hooded seal, long-finned pilot whale, offshore bottlenose dolphin, Risso's dolphin, and common dolphin. Not mentioned here are possible interactions with sea turtles and sea birds. Multispecies fishing vessels would be required to adhere to measures in the Atlantic Large Whale Take Reduction Plan (ALWTRP) to minimize potential impacts to certain cetaceans. ALWTRP was developed to address entanglement risk to right, humpback, and fin whales, and to acknowledge benefits to minke whales in specific Category I or II commercial fishing efforts that utilize traps/pots and gillnets. The ALWTRP calls for the use of gear markings, area restrictions, weak links, and sinking groundline. Fishing vessels would be required to comply with the ALWTRP in all areas where gillnets were used. Fishing vessels would also need to comply with the Bottlenose Dolphin Take Reduction Plan and Harbor Porpoise Take Reduction Plan (HPTRP) within the Northeast multispecies area. The Bottlenose Dolphin Take Reduction Plan restricts night time use of gillnets in the Mid-Atlantic gillnet region. The HPTRP aims to reduce interactions between the harbor porpoise and gillnets in the Gulf of Maine. The HPTRP implements seasonal area closures and the seasonal use of pingers (acoustic devices that emit a sound) to deter harbor porpoises from approaching the nets.

Data from sector trips in FY 2010 and FY 2009 indicate no overall significant increase in take of protected resources or sea turtles (Figure 28). There may be a decrease in annual take in sink gillnet gear, and the data suggest an overall decrease in the winter take, and in the fall for turtles. However, this decrease in take corresponds well to the decrease in ACL. Within individual statistical areas there does appear to be some trends in take of protected resources (includes all species).

Figure 28 - Take of protected resources by statistical area



Sea turtles have been caught and injured or killed in multiple types of fishing gear, including gillnets, trawls, and hook and line gear. However, impact due to inadvertent interaction with trawl gear is almost twice as likely to occur when compared with other gear types (NMFS 2009d). Interaction with trawl gear is more detrimental to sea turtles as they can be caught within the trawl itself and will drown after extended periods underwater. A study conducted in the Mid-Atlantic region showed that bottom trawling accounts for an average annual take of 616 loggerhead sea turtles, although Kemp's ridleys and leatherbacks were also caught during the study period (Murray 2006). Impacts to sea turtles would likely still occur under the Preferred Alternatives even though sea turtles generally occur in more temperate waters than those in the Northeast multispecies area. However, these impacts would be similar to those in the Common Pool.

Atlantic sturgeon are known to be captured in sink gillnet, drift gillnet, and otter trawl gear (Stein et al. 2004a, ASMFC TC 2007). Of these gear types, sink gillnet gear poses the greatest known risk of mortality for bycaught sturgeon (ASMFC TC 2007). Sturgeon deaths were rarely reported in the otter trawl observer dataset (ASMFC TC 2007). However, the level of mortality after release from the gear is unknown (Stein et al. 2004a). In a review of the Northeast Fishery Observer Program (NEFOP) database for the years 2001-2006, observed bycatch of Atlantic sturgeon was used to calculate bycatch rates that were then applied to commercial fishing effort to estimate overall bycatch of Atlantic sturgeon in commercial fisheries. This review indicated sturgeon bycatch occurred in statistical areas abutting the coast from Massachusetts (statistical area 514) to North Carolina (statistical area 635) (ASMFC TC 2007). Based on the available data, participants in an ASMFC bycatch workshop concluded that sturgeon encounters tended to occur in waters less than 50 m throughout the year, although seasonal patterns exist (ASMFC TC 2007). The ASMFC analysis determined that an average of 650 Atlantic sturgeon mortalities occurred per year (during the 2001 to 2006 timeframe) in sink gillnet fisheries. Stein et al. (2004a), based on a review of the NMFS Observer Database from 1989-2000, found clinal variation in the bycatch rate of sturgeon in sink gillnet gear with lowest rates occurring off of Maine and highest rates off of North Carolina for all months of the year.

In an updated, preliminary analysis, the Northeast Fisheries Science Center (NEFSC) was able to use data from the NEFOP database to provide updated estimates for the 2006 to 2010 timeframe. Data were limited by observer coverage to waters outside the coastal boundary (fzone>0) and north of Cape Hatteras, NC. Sturgeon included in the data set were those identified by federal observers as Atlantic sturgeon, as well as those categorized as unknown sturgeon. At this time, data were limited to information collected by the NEFOP; limited data collected in the At-Sea Monitoring Program were not included, although preliminary views suggest the incidence of sturgeon encounters was low.

The preliminary analysis apportioned the estimated weight of all sturgeon takes to specific fishery management plans. The analysis estimates that between 2006 and 2010, a total of 15,587 lbs of Atlantic sturgeon were captured and discarded in bottom otter trawl (7,740 lbs) and sink gillnet (7,848 lbs) gear. The analysis indicates that 7.1% (550 lbs) of the weight of sturgeon discards in bottom otter trawl gear could be attributed to the large mesh bottom trawl fisheries if a correlation of FMP species landings (by weight) was used as a proxy for fishing effort. Additionally, the analysis indicates that 4.0% (314 lb) of the weight of sturgeon discards in sink gillnet gear could be attributed to the large mesh gillnet fisheries if a correlation of FMP species landings (by weight) was used as a proxy for fishing effort.

These additional data support the conclusion from the earlier bycatch estimates that the multispecies fishery may interact with Atlantic sturgeon. Since the Atlantic sutrgeon DPSs are listed as endangered and threatened under the ESA, the ESA Section 7 consultation for the multispecies fishery will be reinitiated, and additional evaluation will be included in the resulting Biological Opinion to describe any impacts of the fisheries on Atlantic sturgeon and define any measures needed to mitigate those impacts, if necessary. Any measures or terms and conditions included in an updated Biological Opinion will further reduce impacts to the species. The Biological Opinion is expected to be completed prior to the 2012 multispecies fishing year (May 1).

6.5 Human Communities and the Fishery

This framework considers the operation of the fishery and evaluates the effect it may have on people's way of life, traditions, and community. These social impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While it is possible that social impacts could be solely experienced by individual sector participants, it is more likely that impacts would be experienced across communities, gear types, and/or vessel size classes.

This section reviews the Northeast multispecies fishery and describes the human communities potentially impacted by the Preferred Alternatives as well as characterizations of catches and revenues. This includes a description of the sector participants as well as their homeports.

6.5.1 Overview of New England Groundfish Fishery

New England's fishery has been identified with groundfishing both economically and culturally for over 400 years. Broadly described, the Northeast multispecies fishery includes the landing, processing, and distribution of commercially important fish that live on the sea bottom. In the early years, the Northeast multispecies fishery related primarily to cod and haddock. Today, the Northeast Multispecies FMP (large-mesh and small-mesh) includes a total of 13 species of groundfish (Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice, Atlantic halibut, redfish, ocean pout, white hake, and wolffish) harvested from three geographic areas (Gulf of Maine, Georges Bank, and southern New England/Mid-Atlantic Bight) representing 19 distinct stocks.

Prior to the industrial revolution, the groundfish fishery focused primarily on cod. The salt cod industry, which preserved fish by salting while still at sea, supported a hook and line fishery that included hundreds of sailing vessels and shore-side industries including salt mining, ice harvesting, and boat building. Late in the 19^{th} century, the fleet also began to focus on Atlantic halibut with landings peaking in 1896 at around 4,900 tons (4,445 mt).

From 1900 to 1930, the fleet transitioned to steam powered trawlers and increasingly targeted haddock for delivery to the fresh and frozen fillet markets. With the transition to steam powered trawling, it became possible to exploit the groundfish stocks with increasing efficiency. This increased exploitation resulted in a series of boom and bust fisheries from 1930 to 1960 as the North American fleet targeted previously unexploited stocks, depleted the resource, and then transitioned to new stocks.

In the early 1960's, fishing pressure increased with the discovery of haddock, hake, and herring off of Georges Bank and the introduction of foreign factory trawlers. Early in this time period, landings of the principal groundfish (cod, haddock, pollock, hake, and redfish) peaked at about 650,000 tons (589,670 mt). However, by the 1970's, landings decreased sharply to between 200,000 and 300,000 tons (181,437 and 272,155 mt) as the previously virgin GB stocks were exploited (NOAA 2007).

The exclusion of the foreign fishermen by the Fisheries Conservation and Management Act in 1976, coupled with technological advances, government loan programs, and some strong classes of cod and haddock, caused a rapid increase in the number and efficiency of U.S. vessels participating in the Northeast groundfish fishery in the late 1970's. This shift resulted in a temporary increase in domestic groundfish landings; however, overall landings (domestic plus foreign) continued to trend downward from about 200,000 tons (181,437 mt) to about 100,000 tons (90,718 mt) through the mid 1980's (NOAA 2007).

In 1986, the NEFMC implemented the Northeast Multispecies FMP with the goal of rebuilding stocks. Since Amendment 5 in 1994, the multispecies fishery has been administered as a limited access fishery managed through a variety of effort control measures including DAS, area closures, trip limits, minimum size limits, and gear restrictions. Partially in response to those regulations, landings decreased throughout the latter part of the 1980's until reaching a more or less constant level of around 40,000 tons (36,287 mt) annually since the mid 1990's.

In 2004, the final rule implementing Amendment 13 to the Northeast Multispecies FMP allowed for self-selecting groups of limited access groundfish permit holders to form sectors. These sectors developed a legally binding operations plan and operated under an allocation of GB cod.

While approved sectors were subject to general requirements specified in Amendment 13, sector members were exempt from DAS and some of the other effort control measures that tended to limit the flexibility of fishermen. The 2004 rule also authorized implementation of the first sector, the GB Cod Hook Sector. A second sector, the GB Cod Fixed Gear Sector, was authorized in 2006.

Through Amendment 16, the NEFMC sought to rewrite groundfish sector policies with a scheduled implementation date of May 1, 2009. When that implementation date was delayed until FY 2010, the NMFS Regional Administrator announced that, in addition to a previously stated 18 percent reduction in DAS, interim rules would be implemented to reduce fishing mortality during FY 2009. These interim measures generally reduced opportunity among groundfish vessels through:

- differential DAS counting, elimination of the SNE/MA winter flounder SAP
- elimination of the state waters winter flounder exemption
- revisions to incidental catch allocations, and
- a reduction in some groundfish allocations (NOAA 2009).

In 2007, the Northeast multispecies fishery included 2,515 permits. Of these permits about 1,400 were limited access, and 658 vessels actively fished. Those vessels include a range of gear types including hook, bottom longline, gillnet, and trawlers (NEFMC 2009a). In FY 2009, between 40 and 50 of these vessels were members of the GB Cod Sectors. The passage of Amendment 16 prior to FY 2010 issued in a new era of sector management in the New England groundfish fishery. Over 50 percent of eligible northeast groundfish multispecies permits and over 95 percent of landings history were associated with sectors in FY 2010. Approximately 56 percent of the eligible northeast groundfish multispecies permits constituting between approximately 99.4 percent and 77.5 percent of the various species ACLs were included in sectors for FY 2011. The remaining vessels were Common Pool groundfishing vessels.

Amendment 16 to the Northeast Multispecies Fishery Management Plan (FMP) was finally implemented for the New England groundfish fishery starting on May 1st 2010, the start of the 2010 fishing year. The new management program contained two significant changes meant to adhere to the catch limit requirements and stock rebuilding deadlines of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSA). The first change developed “hard quota” annual catch limits (ACLs) for 16 of the 19 stocks in the groundfish complex. The second change expanded the use of Sectors, which are allocated subdivisions of ACLs called Annual Catch Entitlements (ACE) based on each sector’s collective catch history. Sectors received ACE for nine of 13 groundfish species in the FMP and became exempt from many of the effort controls previously used to manage the fishery.

During the first year of sector management seventeen sectors operated, each establishing its own rules for using its allocations. Vessels with limited access permits that joined sectors were allocated 98% of the total ACE, based on their collective level of historical activity in the groundfish fishery. A description of groundfish catch by each sector in included as an appendix to this document. Approximately half (46%) of the vessels with limited access groundfish permits opted to remain in the common pool. Common pool vessels act independently of one another, with each vessel constrained by the number of DAS it can fish, by trip limits, and by all of the time and area closures. These restrictions help ensure that the groundfish catch of Common Pool vessels does not exceed the Common Pool’s allocation of the total ACL for all stocks (about 2% for 2010) before the end of the fishing year.

6.5.1.1 Number of Vessels

In 2010, the first year of sector management, the Northeast multispecies fishery issued 1,347 permits, not including groundfish limited access eligibilities held as Confirmation of Permit History (CPH). Out of these permits, 740 vessels belonged to a sector and 607 remained in the common pool. Not all permitted vessels were active and not all active vessels fished groundfish. Of the 740 sector vessels issued groundfish permits, only 444 were considered active, having revenue from any landed species, and only 305 of those had revenue from at least one groundfish trip. Among Common pool vessels, 456 were considered active, and only 145 vessels had made at least one groundfish trip.

Table 23 – Number of groundfish vessels, 2007 – 2010

					2010	
	2007	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Vessels issued limited access groundfish permits as of May 1 each year*	1,413	1,410	1,381	1,347	740	607
With limited access groundfish permit and revenue from any species	1,082	1,012	973	900	444	456
With limited access groundfish permit and revenue from at least one groundfish trip	658	611	566	450	305	145
Number and percent of inactive (no landings) vessels	331 (32%)	398 (28%)	408 (30%)	447 (33%)	296 (40%)	151 (25%)

* These numbers exclude groundfish limited access eligibilities held as Confirmation of Permit History (CPH). Starting in 2010, Amendment 16 authorized CPH owners to join Sectors and to lease DAS. For purposes of comparison, CPH vessels are not included in the 2010 data for either Sector or Common Pool.

A key aspect of Amendment 16, and catch share programs in general, is the ability to jointly decide how a sector will harvest its ACE through redistribution of PSC within a sector and the ability to transfer ACE between sectors. Because it is then not possible to identify the extent to which inactive vessels in sectors may benefit if other sector vessels harvest their allocation, changes in the number of inactive vessels may describe a transfer of allocation and not necessarily vessels exiting the fishery. In 2010, 447 vessels (33%) were inactive (no landings). Of these inactive vessels, 296 were sector vessels and 151 were common pool vessels. The number of inactive vessels in 2010 can be compared to the number of inactive vessels in other years: 331 vessels (32%) in 2007, 398 vessels (28%) in 2008, and 408 vessels (30%) in 2009.

6.5.1.2 Landings

Total groundfish landings on trips made by vessels possessing a limited access groundfish permit in 2010 were 58.5 million pounds, which had declined from a recent high of 72.2 million pounds in 2008. Because only 20 groundfish stocks are limited by sector allocations it is important to consider the landings of non-groundfish species and groundfish species separately as a means of describing any possible shift in effort to other fisheries. Non-groundfish landings made by limited access vessels also declined from a high of 205.0 million pounds in 2008 to 180.6 million pounds in 2010. The total landings of all species by limited access vessels in the Northeast multispecies fishery was about 239.1 million pounds in 2010. This compares to landings ranging from 259.5 million pounds to 277.1 million pounds in the 2007–2009 fishing years (Table 24). While sector vessels accounted for 65% of all landings made in 2010, sector vessels also made 98% of groundfish landings and 54% of non-groundfish landings.

Table 24 – Landings (in thousands of lbs.), 2007 – 2010

	Year					
					2010	
Landings	**2007**	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Total Landings	259448	277118	262679	239103	155032	84072
Total Groundfish Landings	64004	72162	70568	58492	57068	1424
Total Non-groundfish Landings	195444	204955	192111	180611	97963	82647

Combined, 171 million (live) pounds of ACE was allotted to the sectors in 2010 but only 65 million (live) pounds were landed. Of the 16 groundfish stocks that sectors were given allocation, only landings of 6 stocks approached (>80% conversion) the catch limit set by the total allocated ACE (Table 24). The majority of the unrealized landings were caused by a failure to land Georges Bank haddock that when combined, East and West GB haddock, accounted for 66 million pounds (62%) of the un-landed ACE.

Table 25 – Catch and ACE at the stock level (live lbs.). Stocks with >80% ACE conversion highlighted in bold font.

	Allocated ACE	2010 Catch	% caught
GB cod, East	**690,614**	**559,490**	**81%**
GB cod, West	**6,317,690**	**5,441,462**	**86%**
GOM cod	**9,355,985**	**7,911,669**	**85%**
GB haddock, East	24,875,632	4,094,549	16%
GB haddock, West	59,039,163	14,171,789	24%
GOM hadock	1,683,057	818,239	49%
Plaice	5,836,518	3,336,272	57%
Pollock	34,156,917	11,483,386	34%
Redfish	14,109,702	4,702,621	33%
White hake	**5,292,674**	**4,951,889**	**94%**
GB winter flounder	3,980,218	3,048,553	77%
GOM winter flounder	288,899	176,784	61%
Witch flounder	**1,745,117**	**1,540,038**	**88%**
CC/GOM yellowtail flounder	1,581,720	1,233,481	78%
GB yellowtail flounder	**1,738,477**	**1,632,512**	**94%**
SNE/MA yellowtail flounder	504,685	351,362	70%
Grand Total	171,197,069	65,454,096	38%

6.5.1.3 Revenues

Among vessels with limited access groundfish permits, groundfish revenues in 2010 were $83.3 million which is lower than 2007 – 2009 nominal revenues which ranged from $85.1 million in 2009 to $90.1 million in 2008. Non-groundfish revenues in 2010 rose to $214.4 million, higher than 2007 – 2009 non-groundfish revenues which ranged from $186.1 million in 2009 to $209.2 million in 2007. Revenues from all species for 2010 totaled $297.7 million. This compares to revenues that ranged from a low of $271.1 million in 2009 to a high of $298.2 million in 2007. Although total landings by vessels possessing a limited access groundfish permit in 2010 were down compared to the previous three years, combined revenues from groundfish and non-groundfish species were almost as high as the highest earning year. Sector vessels accounted for about 67% of all revenue earned by limited access permitted vessels in 2010. Sector vessels also earned 97% of revenue from groundfish landings and 55% of non-groundfish revenue.

Table 26 – Revenue (in thousands of dollars), 2007 – 2010

	Year					
					2010	
Revenue	2007	2008	2009	2010	Sector Vessels	Common Pool
Total Revenue	$298,246	$291,479	$271,140	$297,720	$198,264	$99,456
Total Groundfish Revenue	$89,055	$90,132	$85,088	$83,294	$81,026	$2,268
Total Non-groundfish Revenue	$209,191	$201,347	$186,052	$214,426	$117,239	$97,188

6.5.1.4 Effort

Some of the proposed benefits of a catch share system of management are the potential efficiency gains associated with increasing operational flexibility. Being released from the former effort controls but being held by ACLs, sector vessels were expected to increase their catch per unit effort by decreasing effort. Between 2007 and 2010, the total number of groundfish fishing trips and total days absent on groundfish trips declined by 48% and 33%, respectively (27,004 trips in 2007 vs. 14,045 trips in 2010; 28,158 days absent in 2007 vs. 18,818 days absent in 2010) (Table 27). A groundfish trip is defined as a trip where the vessel owner or operator declared, either through the vessel monitoring system or through the interactive voice response system, that the vessel was making a groundfish trip. During this same four-year period, the number of non-groundfish trips, and days absent on non-groundfish trips, increased slightly (46,635 trips in 2007 vs. 47,539 trips in 2010; 35,186 days absent in 2007 vs. 35,220 days absent in 2010) (Table 27). Average trip length on both groundfish and non-groundfish trips were not statistically different during the time series (Table 27).

Table 27 – Effort by active vessels, 2007 – 2010

					2010	
	2007	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Number of groundfish trips	27,004	26,468	26,032	14,045	11,770	2,275
Number of non-groundfish trips	46,635	46,721	46,815	47,539	20,061	27,478
Number of days absent on groundfish trips	28,158	27,146	24,947	18,818	17,216	1,602
Number of days absent on non-groundfish trips	35,186	36,134	36,397	35,220	17,785	17,435
Average trip length on groundfish trips	7.63	7.82	8.06	8.55	8.70	3.31
(standard deviation)	(6.15)	(5.98)	(6.10)	(6.07)	(6.02)	(3.93)
Average trip length on non-groundfish trips	5.42	4.78	4.85	4.82	5.52	4.21
(standard deviation)	(5.95)	(5.67)	(5.84)	(5.81)	(6.44)	(5.25)

6.5.1.5 Fleet Characteristics

The groundfish fishery has traditionally been made up of a diverse fleet, comprised of a range of vessels sizes and gear types. Over the years, as vessels entered and exited the fishery, the “typical” characteristics defining the fleet changed as well. The groundfish fleet is divisible into four “vessel size categories,” vessels less than 30 feet in length, vessels between 30 and 50 feet in length, vessels between 50 and 75 feet in length and vessels greater than 75 feet in length. As mentioned above, the number of active vessels in 2010 had declined compared to the previous three years and this decline occurred across all vessel size categories between 2007 and 2010.The 30’ to < 50’ vessel size category, which has the largest number of active vessels, experienced a 17% decline (572 to 476 active vessels) during the past 4 years. Most (224) sector vessels fell into this 30’ to 50’ size category. The 50’ to < 75’ vessel size category, containing the second largest number of vessels, experienced a 20% reduction during 2007 to 2010 (289 to 229 active vessels). The 50’ to < 75’ size category also had the second largest number of sector vessels with 127. The number of active vessels in both the smallest (less than 30’) and largest (75’ and above) vessel size categories declined by 12% between 2007 and 2010. The decline was consistent across all four years in all vessel size categories.

The 30’ to 50’ vessel size category also contains the largest number of active groundfish vessels making at least one groundfish trip. Between 2007 and 2010, this vessel size category experienced a 30% reduction in active groundfish vessels (350 to 247 vessels). The 50’ to 75’ vessel size category, containing the second largest number of active groundfish vessels, underwent a 39% reduction, declining from 193 vessels in 2007 to 119 vessels in 2010. Between 2007 and 2010, the over 75’ vessel size category experienced a 25% decline in active groundfish vessels (85 to 63 vessels), while the number of active groundfish vessels in the < 30’ vessel size category declined by 24% (29 to 22 vessels). The decline was consistent across all four years in all vessel size categories except for the 30’ to < 50’ category in which the largest decline occurred between 2009 and 2010 (Table 28).

During the first year of sector management, the numbers of vessels that joined a sector or stayed in the common pool were evenly split within size categories with the exception of the largest and smallest categories. For active vessels larger than 75’ total length, 67% belong to a sector, and for vessels larger than 75’ making at least one ground fish trip 97% are sector vessels. Active vessels in the smallest size category, those smaller than 30’ in length, 84% remained in the common pool, and of those vessels smaller than 30’ making at least one groundfish trip, 95% were in the common pool. Although most sector and common pool vessels are between 30’ and 75’ in length, active vessels smaller than 30’ are more likely common pool vessels and vessels larger than 75’ with at least one groundfish trip are likely to belong to a sector.

Table 28 – Vessel activity by size class, 2007 – 2010

					2010	
Vessel size	**2007**	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Vessels with landings from any species						
Less than 30	83	77	83	73	12	61
30 to < 50	572	528	510	476	224	252
50 to < 75	289	267	248	230	127	103
75 and above	139	140	132	121	81	40
Total	1082	1012	973	900	444	456
Vessels with at least one groundfish trip						
Less than 30	29	26	33	22	1	21
30 to < 50	351	331	312	246	155	91
50 to < 75	194	175	150	119	88	31
75 and above	84	79	71	63	61	2
Total	658	611	566	450	305	145

Fishing effort, as described by either the number of trips taken or the total number of days absent, varies considerably by vessel size. In 2010 more than two thirds of groundfish trips were made by vessels ranging in size from 30 to 50 feet in total length. 2010 saw large reductions in the number of groundfish trips and the total number of days absent on groundfish trips across all vessel size classes compared to the previous three years. In percentage terms, the largest reductions in groundfish trips and days absent on groundfish trips occurred in the less than 30’ vessel size category (63% and 59%, respectively). However, there were only a couple hundred trips per year in this vessel size category. In terms of magnitude, the 30’ to < 50’ vessel size category had the greatest reductions in groundfish trips and days absent (8,478 fewer groundfish trips and 4,187 fewer days absent on groundfish trips from 2007 to 2010). The largest vessel class (75’ and above) experienced reductions of 12% in groundfish trips and 5% in days absent on groundfish trips. The 50’ to < 75’ vessel size category had reductions of about 59% in groundfish trips and about 45% in days absent on groundfish trips. From 2007- 2010, non-groundfish trips and the number of days absent on non-groundfish trips, has remained relatively constant for all vessel size classes.

Table 29 – Vessel effort (as measured by number of trips and days absent) by vessel size category, 2007 – 2010

					2010	
Vessel Size	**2007**	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Number of groundfish trips						
Less than 30	272	239	412	101	1	100
30 to < 50	18200	18453	19384	9716	7957	1759
50 to < 75	7018	6356	4909	2895	2505	390
75 and above	1525	1424	1328	1337	1311	26
Total	27015	26472	26033	14049	11774	2275
Number of non-groundfish trips						
Less than 30	2534	2249	2287	2236	514	1722
30 to < 50	28892	27586	27316	28480	11462	17018
50 to < 75	11979	12825	13425	13523	6419	7104
75 and above	3248	4073	3792	3310	1672	1638
Total	46653	46733	46820	47549	20067	27482
Number of days absent on groundfish trips						
Less than 30	101	82	147	42	1	41
30 to < 50	9580	9586	9246	5393	4237	1156
50 to < 75	10701	9857	8256	5745	5375	370
75 and above	7750	7582	7276	7182	7149	33
Total	28132	27107	24925	18362	16762	1600
Number of days absent on non-groundfish trips						
Less than 30	665	678	689	698	210	488
30 to < 50	11069	10455	10504	11196	4668	6528
50 to < 75	13006	13557	14258	13797	7491	6306
75 and above	10472	11483	10969	9986	5871	4115
Total	35212	36173	36419	35677	18240	17437

Historically, a range of gear types are used in the Northeast groundfish fishery, and often a single vessel will use multiple gear types. Examining gear use at the trip level shows that in 2010, trawl gear and gillnets were used by limited access permitted vessels for 36% and 56% of all groundfish trips respectively. For non-groundfish trips in 2010, 34% were made with pot or trap gear and an additional 34% of trips were made using trawl gear. Since 2007 the percentage of groundfish trips that use trawl gear has declined while the percentage of trips that use gillnets has been increasing (Table 30). Changes in the type of gear used could represent a conscious decision by the captain and crew of individual vessels to switch fishing methods and gear or it could represent a more general shift in activity among vessels. Both sector vessel and common pool vessel gear use follow similar patterns. The primary gear (by percentage of trips) for groundfish trips are gillnets for both sector and common pool vessels. But while the percentage of groundfish trips made by sector vessels are almost equally made using gillnet and trawl gear, the percentage of groundfish trips made by common pool vessels are overwhelmingly made using gillnets.

Table 30 – Percentage of groundfish and non-groundfish trips made by gear type, 2007 – 2010

					2010	
Gear type	**2007**	**2008**	**2009**	**2010**	**Sector Vessels**	**Common Pool**
Gear use on Groundfish trips						
Gillnet	46.2%	48.9%	53.7%	56.3%	44.8%	11.5%
Handline	2.1%	3.0%	3.8%	2.7%	1.0%	1.7%
Longline	3.4%	2.1%	2.8%	4.0%	3.8%	0.3%
Trawl	46.9%	44.7%	38.6%	35.6%	32.6%	3.0%
Purse seine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pot and Trap	0.2%	0.3%	0.2%	0.4%	0.2%	0.2%
Scallop gear	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	1.1%	0.9%	0.9%	1.1%	0.9%	0.2%
Total	100.0%	100.0%	100.0%	100.0%	83.1%	16.9%
Gear use on non-Groundfish trips						
Gillnet	3.4%	3.8%	4.2%	3.6%	1.0%	2.6%
Handline	12.9%	12.9%	11.9%	12.8%	1.9%	10.9%
Longline	0.3%	0.4%	0.6%	0.3%	0.1%	0.2%
Trawl	26.6%	29.4%	32.9%	33.7%	19.1%	14.7%
Purse seine	0.5%	0.5%	0.5%	0.7%	0.2%	0.5%
Pot and Trap	32.3%	31.8%	31.9%	34.1%	12.5%	21.5%
Scallop gear	10.2%	9.1%	7.1%	6.1%	2.1%	3.9%
Other	13.7%	12.1%	10.8%	8.7%	2.5%	6.1%
Total	100.0%	100.0%	100.0%	100.0%	39.5%	60.5%

6.5.2 Fishing Communities

There are over 100 communities that are homeport to one or more Northeast groundfishing vessels. These ports occur throughout the coastal northeast and mid-Atlantic. Consideration of the social impacts on these communities from proposed fishery regulations is required as part of the National Environmental Policy Act (NEPA) of 1969 and the Magnuson Stevens Fishery Conservation and Management Act, 1976. Before any agency of the federal government may take "actions significantly affecting the quality of the human environment," that agency must prepare an Environmental Assessment (EA) that includes the integrated use of the social sciences (NEPA Section 102(2) (C)). National Standard 8 of the MSA stipulates that "conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" (16 U.S.C. § 1851(a) (8)).

A "fishing community" is defined in the Magnuson-Stevens Act, as amended in 1996, as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (16 U.S.C. § 1802(17)). Determining which fishing communities are "substantially dependant" on, and "substantially engaged" in, the groundfish fishery can be difficult. In recent amendments to the fishery management plan the council has categorized communities dependent on the groundfish resource into primary and secondary port groups so that community data can be cross-referenced with other demographic information. Appendix (x) provides descriptions of 26 of the most important communities involved in the multispecies fishery and further descriptions of North East fishing communities in general can be found on North East Fisheries Science Center's website (http://www.nefsc.noaa.gov/read/socialsci/community_profiles/)

Although it is useful to narrow the focus to individual communities in the analysis of fishing dependence there are a number of potential issues with the confidential nature of the information. There are privacy concerns with presenting the data in such a way that proprietary information (landings, revenue, etc.) can be attributed to an individual vessel or a small group of vessels. This is particularly difficult when presenting information on small ports and communities that may only have a small number of vessels and that information can easily be attributed to a particular vessel or individual.

6.5.2.1 Vessel Activity

At the state level, Massachusetts has the highest number of active vessels with a limited access groundfish permit. From 2007 to 2010 the total number of active vessels with revenue from any species on all trips declined 17% (1,082 to 900). All states have shown a decline in the number of active vessels since 2007, but the largest percentage decline has occurred in Connecticut where the number of active vessels dropped 33% by 2010 (Table 31). Just over half of the active vessels belonging to a sector have a homeport in Massachusetts (266 vessels), while New Jersey and Connecticut are the two states in the North East with the fewest vessels belonging to a sector. At the level of home port, there is even greater variation between the ports with regard to the numbers of active vessels.

Table 31 – Number of active vessels with revenue from any species (all trips) by home port and state

Home Port State/City		2007	2008	2009	2010	2010 Sector Vessels	2010 Common Pool
CT		18	13	13	12	4	8
MA		544	502	488	446	266	180
	BOSTON	80	69	66	56	40	16
	CHATHAM	46	41	44	43	31	12
	GLOUCESTER	124	116	113	110	71	39
	NEW BEDFORD	93	91	87	71	50	21
	SCITUATE	19	20	20	16	10	6
ME		128	116	115	107	64	43
	PORTLAND	22	18	16	16	14	2
NH		70	65	62	57	37	20
	PORTSMOUTH	23	18	19	18	12	6
	RYE	16	16	15	14	10	4
NJ		67	71	63	58	2	56
	BARNEGAT LIGHT	21	19	16	15		15
NY		98	100	96	94	15	79
	MONTAUK	37	40	40	39	9	30
RI		110	104	95	88	43	45
	NEWPORT	20	19	16	14	3	11
	POINT JUDITH	58	54	49	47	34	13
All Other States		47	41	41	38	13	25
Grand Total		1,082	1,012	973	900	444	456

Massachusetts is also the state with the highest number of active vessels with revenue from at least one groundfish trip. From 2007 to 2010 the total number of active vessels with revenue from at least one groundfish trip declined 32% (658 to 450). While all states showed a decline in the number of vessels making groundfish trips the largest percentage decline (51%: 41 to 20 vessels) occurred in New Jersey (Table 32). Of the sector vessels making groundfish trips in 2010 almost two thirds of them have a homeport in Massachusetts (191 vessels). Again, New Jersey and Connecticut are the two states with the fewest sector vessels making groundfish trips.

Table 32 – Number of vessels with revenue from at least one groundfish trip by home port and state

Home Port State/City		Year 2007	2008	2009	2010	2010 Sector Vessels	2010 Common Pool
CT		9	8	8	7	3	4
MA		341	321	312	240	191	49
	BOSTON	54	49	43	36	33	3
	CHATHAM	26	27	28	25	22	3
	GLOUCESTER	95	88	96	75	60	15
	NEW BEDFORD	60	62	53	33	29	4
	SCITUATE	12	14	14	8	8	
ME		78	69	63	42	37	5
	PORTLAND	20	16	14	14	13	1
NH		44	42	43	32	26	6
	PORTSMOUTH	14	11	13	10	8	2
	RYE	11	11	11	8	7	1
NJ		41	34	25	20	1	19
	BARNEGATE LIGHT	16	11	11	9		9
NY		52	56	44	41	8	33
	MONTAUK	20	24	18	19	5	14
RI		78	70	60	57	34	23
	NEWPORT	11	11	8	7	2	5
	POINT JUDITH	43	36	32	33	28	5
All Other States		15	11	11	11	5	6
Grand Total		658	611	566	450	305	145

6.5.2.2 Employment

Along with the restrictions associated with presenting confidential information there is also limited quantitative socio-economic data upon which to evaluate the community specific importance of the multispecies fishery. In addition to the direct employment of captains and crew, the industry is known to support ancillary businesses such as gear, tackle, and bait suppliers; fish processing and transportation; marine construction and repair; and restaurants. Regional economic models do exist that describe some of these inter-connections at that level (Olson and Clay 2001, Thunberg 2007, Thunberg 2008, NMFS 2010, and Clay et al. 2008).

Throughout the Northeast, many communities benefit indirectly from the multispecies fishery but these benefits are often difficult to attribute. The direct benefit from employment in the fishery can be estimated by the number of crew positions. However, crew positions do not equate to the number of jobs in the fishery and do not make the distinction between full and part-time positions. Crew positions are measured by summing the average crew size of all active vessels on all trips. In 2010 vessels with limited access groundfish permits provided 2,281 crew positions with more than half coming from vessels with home ports in Massachusetts. Since 2007, the total number of crew positions provided by limited access groundfish vessels has declined by 15% (2,687 positions to 2281). Declines in crew positions occurred across all home port states (Table 33). Vessels with a home port in Connecticut and New Hampshire experienced the largest percentage decline (20%: 52 to 41 crew positions in CT and 139 to 111 crew positions in NH), while vessels home ported in New York had the lowest percentage decline (1%: 204 to 201 crew positions). All other home port states had crew position reductions ranging from 10 to 18% between 2007 and 2010 (Table 33). Overall, in 2010, sector vessels provided 54% of crew positions on active vessels.

Table 33 – Number of crew positions on active vessels by home port and state

Home Port State/City		Year 2007	2008	2009	2010	2010 Sector Vessels	2010 Common Pool
CT		52	39	43	41	14	28
MA		1402	1311	1264	1155	738	417
	BOSTON	237	209	198	164	121	44
	CHATHAM	87	85	87	92	75	17
	GLOUCESTER	272	259	254	239	166	74
	NEW BEDFORD	418	400	389	329	224	105
	SCITUATE	37	41	42	33	24	8
ME		276	250	245	238	160	77
	PORTLAND	62	54	52	57	47	10
NH		139	123	119	111	77	35
	PORTSMOUTH	56	40	38	34	27	8
	RYE	25	24	24	24	19	6
NJ		167	185	164	150	7	143
	BARNEGAT LIGHT	54	52	43	38	0	38
NY		204	214	215	201	50	151
	MONTAUK	85	94	97	90	32	58
RI		304	281	264	252	142	110
	NEWPORT	72	63	56	50	10	40
	POINT JUDITH	175	163	155	148	114	35
All Other States		145	144	128	132	52	80
Grand Total		2687	2545	2442	2281	1239	1042

As a subset of all active limited access groundfish vessels, those making at least one groundfish trip, had greater percentage reductions in the number of crew positions. In 2010, 1185 crew positions were available on vessels that made at least one groundfish trip. This represents a 29% decline from 1674 crew positions in 2007 to 1185 in 2010. Maine and New Jersey were the two states with the largest decline in crew positions on vessels making at least one groundfish trip, with a 39% decrease in Maine and 44% decrease in New Jersey (Table 34). In 2010 sector vessels provided 73% of the crew positions on vessels making at least one groundfish trip.

Table 34 – Number of crew positions on vessels making at least one groundfish trip by home port and state

Home Port State/City		2007	2008	2009	2010	2010 Sector Vessels	2010 Common Pool
CT		24	18	22	19	7	12
MA		900	859	817	646	546	100
	BOSTON	164	156	133	109	103	7
	CHATHAM	66	69	66	62	56	6
	GLOUCESTER	216	207	220	184	154	30
	NEW BEDFORD	234	229	209	134	122	12
	SCITUATE	27	30	34	20	20	
ME		184	169	153	112	102	10
	PORTLAND	56	45	43	49	45	4
NH		94	82	92	72	60	13
	PORTSMOUTH	38	28	32	23	19	3
	RYE	20	19	19	17	15	2
NJ		96	83	64	54	4	50
	BARNEGAT LIGHT	38	27	28	23	0	23
NY		113	123	91	87	27	59
	MONTAUK	54	60	38	44	17	26
RI		213	195	170	162	105	57
	NEWPORT	34	40	33	23	6	18
	POINT JUDITH	131	112	95	100	87	13
All Other States		48	35	37	33	17	16
Grand Total		1674	1563	1445	1185	868	317

A crew day is another measure of employment opportunity that incorporates information about the time spent at sea earning a share of the revenue. Similar to a “man-hour” this measure is calculated by multiplying a vessel’s crew size by the days absent from port, and since the number of trips affects the crew-days indicator, the indicator is also a measure of work opportunity. Conversely, crew days can be viewed as an indicator of time invested in the pursuit of “crew share” (the share of trip revenues received at the end of a trip). The time spent at sea has an opportunity cost. For example if crew earnings remain constant, a decline in crew days would reveal a benefit to crew in that less time was forgone for the same amount of earnings. In 2010 vessels with limited access groundfish permits used 169582 crew days with close to half coming from vessels with home ports in Massachusetts. Since 2007 the total number of crew days used by limited access groundfish vessels has declined by 15% (199593 to 169582 crew days).

Declines in crew days occurred across all home port states (Table 35). Vessels with a home port in New Hampshire experienced the largest percentage decline in crew days (34%: 6443 to 4259 crew days), while vessels home ported in states other than CT, MA, ME, NH, NJ, NY, and RI had the lowest percentage decline (3%: 12158 to 5280 crew days). All other home port states had crew position reductions ranging from 10% to 17% between 2007 and 2010 (Table 35).

Table 35 – Number of crew days spent on all trips by home port and state

Home Port State/City		Year					
						2010	
		2007	2008	2009	2010	Sector Vessels	Common Pool
CT		4261	3779	3747	3718	1398	2320
MA		98094	93182	94033	82359	60496	21863
	BOSTON	22718	20943	19083	17434	14200	3234
	CHATHAM	3505	3578	3250	3034	2832	202
	GLOUCESTER	14499	14626	15318	13723	10580	3143
	NEW BEDFORD	39559	38030	39861	33421	25825	7596
	SCITUATE	1503	1697	1633	1090	855	235
ME		17872	15882	15905	15511	12660	2851
	PORTLAND	6487	5630	5865	6994	6526	468
NH		6443	6135	6438	4259	3305	955
	PORTSMOUTH	3572	2983	2915	1787	1464	324
	RYE	1045	1003	1242	947	856	91
NJ		12035	12987	11036	10476	1045	9431
	BARNEGAT LIGHT	3622	3042	2301	2439	0	2439
NY		16656	15975	16612	15070	8354	6716
	MONTAUK	10029	9535	9765	8849	6300	2549
RI		32072	29690	26657	26415	19391	7024
	NEWPORT	7633	6124	5076	4708	995	3713
	POINT JUDITH	20689	20090	18064	17354	15684	1670
All Other States		12158	14794	12515	11772	6493	5280
Grand Total		199593	192423	186944	169582	113141	56440

The number of crew positions and crew days give some indication of the direct benefit to communities from the multispecies fishery through employment. But these measures, by themselves, do not show the benefit or lack thereof at the individual level. Many groundfish captains and crew are second- or third-generation fishermen who hope to pass the tradition on to their children. This occupational transfer is an important component of community continuity as fishing represents an important occupation in many of the smaller port areas.

6.5.3 ACE Usage in the Fishery

6.5.3.1 FY 2010 Groundfish Catch Accounting

Amendment 16 adopted ACLs for the multispecies fishery. FY 2010 was the first year using this system. Table 36 through Table 38 summarize the catches by the various components of the ACLs. These tables are based on landings and discard information available to NMFS in September, 2011 and may be updated as more data become available. This information was used to inform decisions on the composition of the ACLs in section 4.1.5.2.

ACLs were exceeded for GOM/GB (Northern) and SNE/MAB (Southern) windowpane flounder. While the overage for northern windowpane flounder was small, the catch for southern windowpane flounder was more than twice the ACL and exceeded the ABC for that stock and exceeded the OFL. The overage was primarily due to catches of this stock by the scallop fishery and other subcomponents.

Table 36 - FY 2010 End of Year Accounting of NE Multispecies Catch (mt) (see notes on following page)

Stock	**Total Groundfish Catch**	NE Multispecies Catch by Fishery Component							
		Groundfish Fishery	Sector	Common Pool	Recreational[1]	Herring Fishery	Scallop Fishery	State Water[2,3]	Other[3]
	A to G	A+B+C	A	B	C	D	E	F	G
GB cod	3,028.9	2,829.7	2,745.8	84.0				27.7	171.4
GOM cod	5,745.2	5,497.1	3,617.1	226.0	1,654.0			190.3	57.8
GB Haddock	8,542.0	8,340.2	8,248.0	92.2		69.2		1.6	131.0
GOM Haddock	784.6	774.0	370.5	7.1	396.3	0.5		8.5	1.6
GB Yellowtail Flounder	809.7	757.6	739.0	18.6			17.6	0.0	34.4
SNE Yellowtail Flounder	314.7	171.9	152.5	19.4			113.0	6.7	23.1
CC/GOM Yellowtail Flounder	671.4	596.7	559.8	36.9				33.2	41.6
Plaice	1,607.7	1,536.4	1,503.7	32.8				25.1	46.2
Witch Flounder	832.5	725.3	695.4	30.0				23.5	83.7
GB Winter Flounder	1,531.3	1,391.2	1,382.4	8.8				0.0	140.1
GOM Winter Flounder	193.5	106.1	80.7	25.4				64.2	23.2
SNE Winter Flounder	370.1	47.4	42.3	5.1				181.0	141.8
Redfish	2,166.9	2,151.2	2,143.3	7.9				10.5	5.2
White Hake	2,344.7	2,259.8	2,215.6	44.2				25.3	59.6
Pollock	7,532.0	5,601.1	5,449.8	151.2				1,059.8	871.1
Northern Windowpane	162.6	153.5	151.7	1.8				0.0	9.1
Southern Windowpane	534.9	73.6	52.7	20.9				31.0	430.3
Ocean Pout	102.4	65.2	56.5	8.7				0.0	37.1
Halibut	36.2	27.8	25.6	2.2				6.6	1.8
Wolffish	22.5	22.4	18.9	3.5				0.0	0.1

[1]Discard estimate not available

[2]Recreational discard estimate only; commercial discard estimate not available

[3]See Table 1A for additional detail

Values in live weight
Includes estimate of missing dealer reports
Source: NMFS Northeast Regional Office
Run Date: September 15, 2011

Any value for a non-allocated species may be due to landings of that stock; misreporting of species and/or stock area; and/or estimated landings (in lieu of missing reports) based on vessel histories. These include SNE winter flounder, northern windowpane, southern windowpane, ocean pout, halibut, and wolffish.

These data are the best available to NOAA's National Marine Fisheries Service (NMFS). Data sources for this report include: (1) Vessels via VMS; (2) Vessels via vessel logbook reports; (3) Dealers via Dealer Electronic reporting. Differences with previous reports are due to corrections made to the database.

Table 37 - FY 2010 End of Year Accounting Detail of NE Multispecies Catch (mt)

Stock	Total Groundfish Catch	NE Multispecies Catch by Fishery Component								
		Groundfish Fishery	Sector	Common Pool	Recreational[1]	Herring Fishery	Scallop Fishery	State Water Commercial[1]	State Water Recreational	Other
	A to G	A+B+C	A	B	C	D	E	F		G
GB cod	3,028.9	2,980.7	2,745.8	84.0	151.0		8.1	27.7		12.4
GOM cod	5,745.2	5,497.1	3,617.1	226.0	1,654.0		0.0	190.3		57.8
GB Haddock	8,542.0	8,340.2	8,248.0	92.2		69.2	2.6	1.6		128.4
GOM Haddock	784.6	774.0	370.5	7.1	396.3	0.5	0.0	8.5		1.6
GB Yellowtail Flounder	809.7	757.6	739.0	18.6			17.6	0.0		34.4
SNE Yellowtail Flounder	314.7	171.9	152.5	19.4			113.0	6.7		23.1
CC/GOM Yellowtail Flounder	671.4	596.7	559.8	36.9			7.4	33.2		34.2
Plaice	1,607.7	1,536.4	1,503.7	32.8			1.1	25.1		45.1
Witch Flounder	832.5	725.3	695.4	30.0			15.7	23.5		68.0
GB Winter Flounder	1,531.3	1,391.2	1,382.4	8.8			29.2	0.0		110.9
GOM Winter Flounder	193.5	106.1	80.7	25.4			1.7	20.1	44.1	21.4
SNE Winter Flounder	370.1	47.4	42.3	5.1			72.6	48.4	132.6	69.1
Redfish	2,166.9	2,151.2	2,143.3	7.9			0.0	10.5		5.2
White Hake	2,344.7	2,259.8	2,215.6	44.2			7.7	25.3		51.9
Pollock	7,532.0	6,463.4	5,449.8	151.2	862.3		0.0	455.5	604.3	8.8
Northern Windowpane	162.6	153.5	151.7	1.8			8.2	0.0		0.9
Southern Windowpane	534.9	73.6	52.7	20.9			178.3	31.0		252.0
Ocean Pout	102.4	65.2	56.5	8.7			10.0	0.0		27.1
Halibut	36.2	27.8	25.6	2.2			0.1	6.6		1.7
Wolffish	22.5	22.4	18.9	3.5			0.0	0.0		0.1

Table 38 - FY 2010 End of Year Accounting of NE Multispecies Catch - Percent of Annual Catch Limit (ACL) Caught (%)

Stock	ACLs and sub-ACLs: With accountability measures (AMs)							sub-components: No AMs	
	% of Total ACL	% of Groundfish sub-ACL	% of Sector sub-ACL	% of Common Pool sub-ACL	% of Recreational sub-ACL	% of Herring Fishery sub-ACL	% of Scallop Fishery sub-ACL	% of State Water	% of Other
	A to G	A+B+C	A	B	C	D	E	F	G
GB cod	83.7	82.5	83.2	65.6				73.0	112.8
GOM cod	71.0	75.9	83.6	94.2	61.9			33.6	20.4
GB Haddock	20.0	20.6	20.5	36.3		82.3		0.3	7.3
GOM Haddock	65.5	67.4	46.4	27.4	122.3	25.5		94.6	4.4
GB Yellowtail Flounder	79.3	92.1	92.0	93.1			12.1	NA	66.2
SNE Yellowtail Flounder	67.0	55.4	64.9	25.9			83.7	134.4	115.5
CC/GOM Yellowtail Flounder	81.7	76.6	76.8	73.8				368.6	118.7
Plaice	53.5	53.9	54.7	32.8				78.3	36.7
Witch Flounder	92.6	85.1	84.1	119.9				261.2	220.2
GB Winter Flounder	78.3	75.1	75.8	30.3				NA	136.0
GOM Winter Flounder	83.8	67.2	60.7	101.6				107.1	192.9
SNE Winter Flounder	61.2	9.1	NA	NA				341.4	443.1
Redfish	30.0	31.4	31.7	8.8				13.9	1.7
White Hake	86.9	88.4	88.4	86.6				90.2	52.8
Pollock	39.8	33.8	33.7	40.3				89.2	73.3
Northern Windowpane	101.0	139.5	NA	NA				0.4	18.6
Southern Windowpane	237.7	47.8	NA	NA				1,550.1	623.6
Ocean Pout	40.5	27.3	NA	NA				1.1	337.4
Halibut	52.5	92.8	NA	NA				18.2	45.9
Wolffish	29.2	30.7	NA	NA				2.7	2.7

6.5.3.2 Sector ACE Transfers

The following data on ACE leasing by groundfish sectors are summarized from the NEFSC's "2010 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2010 – April 2011)" (NEFSC, 2011). More information on transfer and leasing of ACE can be found in that report.

Leases between sectors leases are formally reported in the sectors' year-end annual reports, noting the stock, total weight and, often but not always, any compensation. Catch and individual allocation data at the MRI level can be combined with between-sector lease data to estimate the size of these two components of the lease market.

Comparing catch in live pounds to allocated ACE/PSC shows that 281 Sector-affiliated MRIs had catch that exceeded individual PSC allocations for at least one stock. These MRIs are assumed to have been lessees in 2010, leasing in over 22 million pounds of ACE and/or PSC. A similar comparison at the vessel affiliation level shows that, of 384 vessel affiliations with ownership in at least one sector-based vessel, 225 groups were active lessees, leasing in almost 9.9 million pounds (Table 39). Gloucester, MA had the largest number of lessees with 54 (Table 39).

While lessee fishermen and/or vessel affiliations can be determined by comparing catch to allocated PSC at the MRI level, the fishermen on the other side of those transactions (lessors) are more difficult to identify. Fishermen who failed convert their allocated PSC into catch may be easily identified (724 sector-based MRIs had zero groundfish catch), but these permits create a pool of potential ACE/PSC that is much larger than the lessee requirement pool. Further, many active fishermen chose to lease ACE/PSC for particular stocks while targeting others, so those with zero catch are not the sole pool of potential lessors. End-of-year reporting by the sectors contains information on within-sector PSC leases, and future analysis of this information may provide a basis for a better understanding the lessor side of the market, but at this time it is not possible to determine which specific vessels were lessors.

Table 39 – Number of lessee MRIs and vessel affiliations leasing ACE and/or PSC in 2010 by homeport state

		MRI		Vessel Affiliation*	
Home Port State	Home Port	Count	Live lbs	Count	Live lbs
CT			confidential		confidential
MA		179	15,974,243	129	5,176,507
	Boston	29	3,066,964	10	298,001
	Chatham	18	527,311	18	385,573
	Gloucester	54	3,571,880	40	2,038,789
	New Bedford	33	6,933,931	16	967,394
ME		33	4,547,645	30	3,126,130
	Portland	11	3,374,993	9	2,221,303
NH		20	586,546	21	653,274
NJ			confidential		confidential
NY		10	108,717	9	316,367
RI		28	921,542	27	574,423
	Point Judith	23	788,865	22	461,837
All Other States		7	48,465	6	14,738
Grand Total		281	22,207,066	225	9,895,598

* Ownership group assigned to the state in which the majority of permits held are homeported.

Table 40 – ACE and PSC lease markets by stock (live lbs.)

	Lessor Availability[1]	Lessee Requirement[2]	Between-Sector Leased[3]		Within-Sector Leased[4]	
Cod, GB East	502,821	371,696	142,288	38%	229,408	62%
Cod, GB West	3,983,057	3,106,829	2,146,442	69%	960,387	31%
Cod, GOM	5,251,700	3,807,384	2,115,195	56%	1,692,189	44%
Haddock, GB East	21,227,896	446,813	945,811	212%	-	-
Haddock, GB West	45,914,363	1,046,989	1,787,990	171%	-	-
Haddock, GOM	1,258,466	393,648	510,807	130%	-	-
Plaice	4,015,461	1,515,215	799,484	53%	715,731	47%
Pollock	25,286,865	2,613,334	3,240,773	124%	-	-
Redfish	10,883,027	1,475,946	1,139,517	77%	336,429	23%
White hake	3,317,306	2,976,521	1,409,496	47%	1,567,025	53%
Winter flounder, GB	2,611,258	1,679,593	247,090	15%	1,432,503	85%
Winter flounder, GOM	206,560	94,445	78,819	83%	15,626	17%
Witch flounder	998,440	793,361	392,939	50%	400,422	50%
Yellowtail flounder, CC/GOM	1,129,982	781,742	376,961	48%	404,781	52%
Yellowtail flounder, GB	1,021,116	915,152	249,780	27%	665,372	73%
Yellowtail flounder, SNE	341,722	188,399	104,581	56%	83,818	44%
Grand total	49,389,968	22,207,066	15,687,973	71%	6,519,093	29%

[1] Sum of uncaught ACE
[2] Difference between summed catch and allocated ACE
[3] From NMFS inter-Sector ACE lease database
[4] Assumes all inter-Sector leased ACE converted to catch.

Table 41 – Number of between-sector ACE lease transaction totals, by month and fishing year

Fishing Year	Month	Number of Leases	Number of Leases with Compensation Reported	Number of Leases Validated for Model
2010	6	30	0	2
	7	138	2	3
	8	59	0	0
	9	67	0	0
	10	132	12	6
	11	80	27	8
	12	101	23	16
	1	92	59	25
	2	115	63	25
	3	93	64	42
	4	82	56	48
2010 Total		**989**	**306**	**175**
2011	5	126	38	25
	6	107	74	22
	7	72	32	14
	8	196	123	37
	9*	39	30	17
Grand Total		**1,529**	**603**	**290**

* Data through September 25, 2011.

6.5.4 U.S./Canada Fishery Information

U.S./Canada TACs

The U.S. TACs have varied over time as a result of changes to the percentage shares allocated to the U.S. under the Understanding, as well as the stock conditions (fishing mortality and stock size) (Table 42). Stock conditions exert the dominant influence on the size of the TACs, and it should be noted that in some years, there is relatively high scientific uncertainty regarding stock size (see Transboundary Resource Assessment Committee documents). The weighting formula that accounts for current resource distribution and historic catch has changed from 60/40 in 2004 to 90/10 beginning in 2010. Despite this change, the percentage shares for the U.S. have not changed substantially from 2004. The U.S. percentage share of cod increased between 2005 and 2009, decreased in 2010 and 2011, and will increase again in 2012. The U.S. share of haddock had increased since 2008, though the percentage share will not change in 2012 when compared to 2011. The yellowtail flounder share for the U.S. has typically decreased each year since 2004. In FY 2010, discards as a percent of the total catch decreased by 29 percent for cod and by 18 percent for yellowtail.

Table 42 - U.S./Canada TACs (mt) and Percentage Shares by Year

Year	Weighting Formula	TAC	Cod	Haddock	Yellowtail Flounder
2012	90/10	**Total Shared TAC**	**675**	**16,000**	**1,150**
		U.S. TAC	162 (24%)	6,880 (43%)	564 (49%)
		Canada TAC	513 (76%)	9,120 (57%)	586 (51%)
2011	90/10	**Total Shared TAC**	**1,050**	**22,000**	**2,650**
		U.S. TAC	200 (19%)	9,460 (43%)	1,458 (55%)
		Canada TAC	850 (81%)	12,540 (57%)	1,192 (45%)
2010	90/10	**Total Shared TAC**	**1,350**	**29,600**	**1,500**[5]
		U.S. TAC	338 (25%)	11,988 (40.5%)	1,200[6] (64%)
		Canada TAC	1,012 (75%)	17,612 (59.5%)	756 (36%)[7]
2009	85/15	**Total Shared TAC**	**1,700**	**30,000**	**2,100**
		U.S. TAC	527 (31 %)	11,100 (37 %)	1,617 (77 %)
		Canada TAC	1,173 (69 %)	18,900 (63 %)	483 (23 %)
2008	80/20	**Total Shared TAC**	**2,300**	**23,000**	**2,500**
		U.S. TAC	667 (29 %)	8,050 (35 %)	1,950[8] (78 %)
		Canada TAC	1,633 (71 %)	14,950 (65 %)	550 (22 %)
2007	75/25	**Total Shared TAC**	**1,900**	**19,000**	**1,250**
		U.S. TAC	494 (26 %)	6,270 (33 %)	900 (72 %)
		Canada TAC	1,406 (74 %)	12,730 (67 %)	350 (28 %)
2006	70/30	**Total Shared TAC**	**1,700**	**22,000**	**3,000**
		U.S. TAC	374 (22 %)	7,480 (34 %)	2,070 (69 %)
		Canada TAC	1,326 (78 %)	14,520 (66 %)	930 (31 %)
2005	65/35	**Total Shared TAC**	**1,000**	**23,000**	**6,000**
		U.S. TAC	260 (26 %)	7,590 (33 %)	4,260 (71 %)
		Canada TAC	740 (74 %)	15,410 (67 %)	1,740 (29 %)
2004	60/40	**Total Shared TAC**	**1,300**	**15,000**	**7,900**
		U.S. TAC	300 (23 %)	5,100 (34 %)	6,000 (76 %)
		Canada TAC	1,000 (77 %)	9,900 (66 %)	1,900 (24 %)

The percent changes of the U.S. percentage share of each stock compared to the previous year's percentage share are presented in Table 43.

[5] The total shared TAC was developed unilaterally by the Council.
[6] The U.S. TAC was adjusted downwards to 1,047 mt due to an overage of the FY 2009 U.S. TAC.
[7] The Canada TAC was 36 percent of Canada's desired shared TAC of 2,100 mt.
[8] The U.S. TAC was adjusted downwards to 1,868.7 mt due to an overage of the FY 2007 U.S. TAC.

Table 43 - Percent Change of the U.S. Percentage Share by Year

Year	Cod	Haddock	Yellowtail Flounder
2012	26.3	0.0	-10.9
2011	-24.0	6.2	-14.1
2010	-19.4	9.5	-16.9
2009	6.9	5.7	-1.3
2008	11.5	6.1	8.3
2007	18.2	-2.9	4.3
2006	-15.4	3.0	-2.8
2005	13.0	-2.9	-6.6

<u>U.S. Catch of Shared Stocks</u>

U.S. catch of eastern GB cod and haddock and GB yellowtail flounder have varied due to the availability of TAC, pertinent regulations, fish availability, market conditions, and other factors (Table 44). Since 2004, the U.S. haddock TAC has not been a limiting factor; however, access to the eastern U.S./Canada Area was limited due to closures multiple times when the cod and yellowtail flounder TACs were projected to have been caught. The U.S. TAC for GB yellowtail flounder was exceeded twice, by 9 percent, in both FY 2007 and FY 2009.

Table 44 - U.S. Catch of Shared Stocks by Year

Stock	Fishing Year	TAC	Catch		Discards (% of Catch)
		mt	% of TAC	mt	
Cod	2004	300	59%	177	23%
	2005	260	94%	244	64%
	2006	374	90%	335	50%
	2007	494	64%	315	67%
	2008	667	75%	501	15%
	2009	527	89%	467	35%
	2010	338	75%	254	6%
Haddock	2004	5,100	21%	1,060	18%
	2005	7,590	8%	589	12%
	2006	7,480	9%	671	37%
	2007	6,270	5%	307	46%
	2008	8,050	20%	1,649	4%
	2009	11,100	14%	1,563	1%
	2010	11,988	15%	1,905	1%
Yellowtail Flounder	2004	6,000	98%	5,852	8%
	2005	4,260	88%	3,760	9%
	2006	2,070	89%	1,851	29%
	2007	900	109%	981	39%
	2008	1,869	82%	1,531	28%
	2009	1,617	109%	1,770	31%
	2010	1,021	77%	782	13%

Prior to FY 2010, in-season monitoring attributed all cod and haddock catch from trips that fished both inside and outside of the Eastern U.S./Canada Area against the pertinent TAC. Final catch numbers were then adjusted to reflect only the catch that occurred inside the Eastern U.S./Canada Area. This methodology was used for in-season monitoring due to the difficulty of monitoring these trips in real time. Beginning in FY 2010 with the improvement of in-season monitoring methods, cod and haddock catches on trips that fished both inside and outside of the Eastern U.S./Canada Area were only attributed to the U.S. TAC if the catch occurred inside the Eastern U.S./Canada Area. All final catch numbers include adjustments made to reflect live weight, as well as adjustments made to account for the discrepancy between vessel monitoring system data and dealer data.

Pursuant to Regional Administrator authority to modify certain measures to optimize catch (neither under-harvest, nor over-harvest the TACs), NMFS has relied on three management tools: modifications to the cod and yellowtail trip limits, closures to the eastern U.S./Canada Area, and prohibition on the use of flatfish nets. For FY 2008 through FY 2011, NMFS implemented a delay in the opening of the Eastern U.S./Canada Area for vessels fishing with trawl gear in order to avoid trawl fishing during the season when the cod catch rate is usually high. In FYs 2010 and 2011, this measure only applied to common pool vessels. In addition, beginning in FY 2010, modifications to the cod and yellowtail trip limits and prohibition on the use of flatfish nets were only used to optimize catch by common pool vessels. Sector vessels were allocated a portion of the U.S. TAC for each of the shared stocks, and if a sector caught its entire ACE for any stock, it was required to stop fishing in the pertinent stock area.

During FYs 2004-2010 there were several Special Access Programs (SAPs), which provided vessels opportunities to fish in the U.S. Canada Management Area under rules which differed from the generic regulations that apply to the U.S. Canada Management Area. The catch under each of the SAPs (kept and discarded) counted toward the pertinent U.S. TAC specified for each FY (cod, haddock, and yellowtail flounder), and were consistent with the Understanding.

A summary of the number of trips and days-at-sea (DAS) used in the U.S./Canada Management Area since 2004 is presented in Table 45. The total number of trips in the U.S./Canada Management Area in FY 2010 was slightly less than FY 2009. Of the 1,517 trips in the U.S./Canada Management Area in FY 2010, 1,507 of these trips were taken by sector vessels. Sector vessels accounted for all 393 trips in the Eastern U.S./Canada Area in FY 2010. The total number of DAS used in the U.S./Canada Area decreased in FY 2010 by 71 percent when compared to FY 2009 DAS usage.

Table 45 - Summary of Number of Trips and DAS in U.S./Canada Management Area

Fishing Year	Trips			DAS		
	Eastern U.S./Canada Area	Western U.S./Canada Area	Total	Eastern U.S./Canada Area	Western U.S./Canada Area	Total
2004	468	1,424	1,910	1,997	7,808	9,805
2005	213	1,963	2,176	1,081	13,287	14,368
2006	284	1,295	1,579	1,375	7,907	9,282
2007	138	1,134	1,272	686	10,264	10,950
2008	714	559	1,273	4,186	4,804	8,990
2009	446	1,175	1,621	2,515	6,911	9,426
2010	393	1,380	1,517	850	2,542	2,734

Table 46 – Percent of Total Trips Observed in U.S./Canada Management Area

Fishing Year	Percentage of Trips Observed
2006	19%
2007	26%
2008	29%
2009	23%
2010	21%

The number of distinct vessels that fished in the U.S./Canada Management Area each year since 2004 is presented in Table 47. The total number of vessels fishing in the U.S./Canada Management Area in FY 2010 increased compared to FY 2009, and was greater than any other fishing year since 2004. All of the 65 vessels that fished in the Eastern U.S./Canada Management Area in FY 2010 were sector vessels. Only four distinct common pool vessels fished in the Western U.S./Canada Management Area in FY 2010.

Table 47 – Number of Distinct Vessels Fishing in the U.S./Canada Management Area

Fishing Year	Western U.S./Canada Area	Eastern U.S./Canada Area	Total
2004	159	110	162
2005	184	78	184
2006	155	92	161
2007	148	59	151
2008	126	92	147
2009	127	81	136
2010	203	65	203

Table 48 – Canadian Catch of Shared Stocks by Year

Stock	Fishing Year	TAC (mt)	Total Catch (mt)	Total Catch (% of TAC)	Discards (% of Total Catch)
Cod	2004	1,000	1,112	111%	unknown
	2005	640	627	98%	unknown
	2006	1,326	1,448	109%	25%
	2007	1,275	1,195	94%	10%
	2008	1,633	1,529	94%	9%
	2009	1,173	1,209	103%	17%
	2010	976	840	86%	11%
Haddock	2004	9,900	9,745	98%	unknown
	2005	15,410	14,483	94%	unknown
	2006	14,520	12,054	83%	unknown
	2007	12,728	11,951	94%	<1%
	2008	14,950	14,815	99%	<1%
	2009	18,900	17,649	93%	<1%
	2010	17,612	16,623	94%	<1%
Yellowtail Flounder	2004	1,900	95	<1%	unknown
	2005	1,740	29	<1%	unknown
	2006	930	580	62%	unknown
	2007	350	132	38%	80%
	2008	550	158	29%	74%
	2009	483	87	18%	97%
	2010	756	217	29%	92%

A summary of GB yellowtail flounder catch in the scallop fishery is presented in Table 49, and GB yellowtail flounder catch from scallop access areas is presented in Table 50. Both the CA I and CA II Scallop Access Area were closed in FY 2010. The total catch by the scallop fishery in FY 2010 was approximately 85 percent lower compared to total catch in FY 2009, and is also the lowest catch since FY 2005.

Table 49 – Summary of GB Yellowtail Flounder Catch (mt) by the Scallop Fishery[9]

Fishing Year	U.S. TAC	Scallop Fishery sub-ACL	Landings	Discards	Total Catch	Percent of U.S. TAC Caught	Percent of sub-ACL Caught
2005	4,260	na	0.9	213	214	5%	na
2006	2,070	na	7.3	430	437	21%	na
2007	900	na	0.5	189	189	21%	na
2008	1,869	na	4.5	215	220	12%	na
2009	1,617	na	2.3	231	233	14%	na
2010	1,047	146	0.3	34	34	3%	23%

Table 50 – GB Yellowtail Flounder Catch (mt) from Scallop Access Areas

Fishing Year	Access Area	Landings	Discards	Total Catch
2006	CA II Scallop Access Area	3.4	206	210
2007	CA I Scallop Access Area	0.2	24	24
2009	CA II Scallop Access Area	3.3	139	142

6.5.5 Restricted Gear Area Activity in FY 2010

Amendment 16 adopted requirements for common pool vessels to use specific gears in two large areas in SNE and on western GB. The measures for these restricted gear areas (RGAs) are described in section 4.2.4. Fishing activity by common pool vessels in FY 2010 was examined to determine the rate of compliance with these requirements and to determine how the measures may have affected catches.

Fishing activity in the two RGAs was determined from VTRs and compared to the number of trips declared into the areas based on VMS declarations. As shown in Table 51 there were more trips in the areas based on VTRs than were declared as such by VMS. This suggests compliance with the requirement was not widespread. Some of the trips into the SNE/MA RGA were observed which provides an opportunity to compare catches with and without selective gear. There were 12 observed trips where vessels deployed either haddock separator or otter trawls in the RGAs in FY 2010 (Table 52). There were quite a few more observed trips where other gear, particularly sink gillnets, were deployed in the RGAs. Also, there were quite a few more observed trips that deployed otter trawl gear outside of the RGAs and four more trips outside of the RGAs that used haddock separator gear.

[9] Scallop fishery catch summary includes catch in both GB scallop access areas and GB open areas.

On the twelve observed trips the catch rates for several species were not what would be expected. For example, the average catch per day of cod was higher for the haddock separator trawl tows than for the otter trawl trips, the opposite of what would be expected (Table 53). Standard deviations are large and for most species the differences are not statistically significant at the 0.05 level. Part of the reason for the lack of statistical significance is the low sample size for some species that were only caught on a few trips.

Table 51 - Restricted Gear Area (RGA) Activity based on Vessel Trip Report (VTR) Latitude / Longitude Info, and Vessel Monitoring System (VMS) Declarations.

Area	# Trips (VTR data)	# Trips (VMS)	# Vessels (VMS)
Western Georges Bank RGA	14	3	2
Southern New England RGA	688	138	16

Table 52 - Observed Trips in RGAs by vessels using haddock separator or regular otter trawls

Area	Number of Observed Trips
Western Georges Bank RGA	0
Southern New England RGA	12

elve observed trips in the SNE/MA RGA in FY 2010

	OHS		OTF	
	Average of CPUE	**StdDev of CPUE**	**Average of CPUE**	**StdDev of CPUE**
	501	887	130	269
	50	116	117	209
WINDOWPANE)	345	318	787	1,214
LUKE)	343	417	2,783	4,184
ACKBACK)	72	79	598	635
_	282	374	25	61
	3	6	3	7
)	25	56	57	114
	7	16	31	49
	-	-	6	14
)	5	8	58	75
	7	10	1	1
	-	-	-	-
	3	8	24	53
	-	-	1	2
	6,928	13,549	51,386	70,548
	9,176	17,208	13,899	20,308
	-	-	-	-
	2,034	1,989	12,649	21,479
	1,041	**5,256**	**4,345**	**20,003**

6.5.6 Sea Scallop Fishery

The Scallop FMP was implemented in 1982 and limited entry followed in 1994 (Amendment 4). In the fishing years 2002-2010, the landings from the northeast sea scallop fishery stayed above 50 million pounds, surpassing the levels observed historically (Figure 29). The recovery of the scallop resource and consequent increase in landings and revenues was striking given that average scallop landings per year were below 16 million pounds during the 1994-1998 fishing years, less than one-third of the present level of landings.

The limited access scallop fishery consists of 347 vessels. It is primarily full-time, with 250 full-time (FT) dredge, 52 FT small dredge vessels and 11 FT net boats (Table 7 and Table 8, Appendix I of Scallop Framework 23). Since 2001, there has been considerable growth in fishing effort and landings by vessels with general category permits, primarily as a result of resource recovery and higher scallop prices (Table 9 to Table 11, Appendix I). Amendment 11 implemented a limited entry program for the general category fishery reducing the number of general category permits after 2007. In 2010, there were 333 LAGC IFQ permits, 122 NGOM and 285 incidental catch permits in the fishery totaling 740 permits. Although not all vessels with general category permits were active in the years preceding 2008, there is no question that the number of vessels (and owners) that hold a limited access general category permit under the Amendment 11 regulations are less than the number of general category vessels that were active prior to 2008 (Table 11 and Table 12 in Appendix I of Framework 23).

Figure 30 shows that total fleet revenues tripled from about $120 million in 1994 to over $450 million in 2010 (in inflation-adjusted 2010 dollars). Scallop ex-vessel prices increased after 2001 as the composition of landings changed to larger scallops that in general command a higher price than smaller scallops. However, the rise in prices was not the main factor that led to the increase in revenue in the recent years compared to 1994-1998. The increase in total fleet revenue was mainly due to the increase in scallop landings and the increase in the number of active limited access vessels during the same period.

There has been a steady decline in the total DAS used by the limited access scallop vessels from 1994 to 2010 fishing years as a result of the effort-reduction measures since Amendment 4 (1994) (Table 3, Appendix I of Framework 23). The impact of the decline in effort below 30,000 days-at-sea since 2005 (with the exception of 2007) on scallop revenue per vessel was small, however, due to the increase in LPUE from about 1,600 pounds per day-at-sea in 2007 to over 2,000 pounds per day-at-sea in 2010 (Figure 8, Appendix I of Framework 23).

Figure 29 – Scallop landings by permit category and fishing year (dealer data)

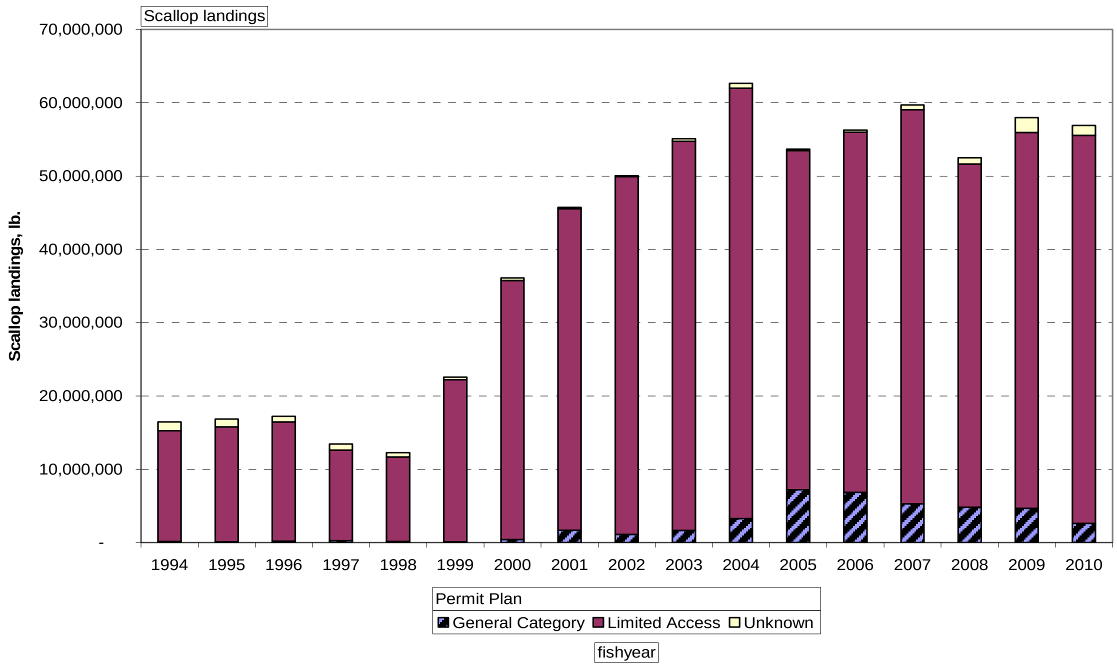
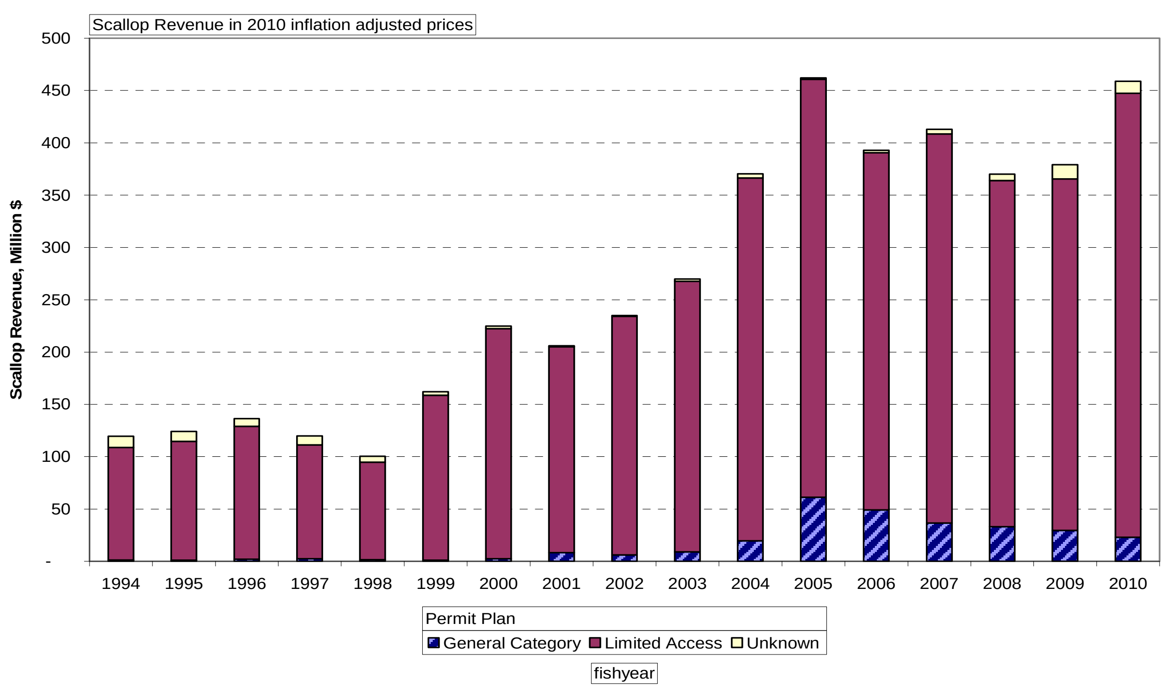


Figure 30 – Scallop revenue by permit category and fishing year in 2010 inflation adjusted prices (dealer data)



Most limited access category effort is from vessels using scallop dredges, including small dredges. The number of vessels using scallop trawl gear has decreased continuously and has been at 11 full-time trawl vessels since 2006 (Section 1.1.6 of Appendix I of Framework 23). Furthermore, according to the 2009-2010 VTR data, the majority of these vessels (10 out of 11 in 2010) landed scallops using dredge gear even though they had a trawl permit. Most general category effort is, and has been, from vessels using scallop dredge and other trawl gear. The percentages of scallop landings show that landings made with a scallop dredge in 2010 continue to be the highest compared to other general category gear types (Table 16 through Table 18, Appendix I of Framework 23).

The sea scallop limited access fishery has a highly concentrated ownership structure (Table 19 to Table 26, Appendix I of Framework 23). According to the ownership data for 2011, only 71 out of 343 vessels belonged to single boat owners (Table 21, Appendix I of Framework 23). The rest were owned by several individuals and/or different corporations with ownership interest in more than one vessel. This is in contrast to the LAGC IFQ fishery which is dominated mostly with single boat owners (155 out of 259 vessels belonged to the single boat owners, Table 27 to Table 30, Appendix I of Framework 23).

Both full-time and part-time limited access vessels had a high dependence on scallops as a source of their income. Full-time limited access vessels had a high dependence on scallops as a source of their income and the majority of the full-time vessels (94%) derived more than 90% of their revenue from the scallop fishery in 2010. Comparatively, part-time limited access vessels were less dependent on the scallop fishery in 2010, with only 46% of part-time vessels earning more than 90% of their revenue from scallops (Table 31, Appendix I of Framework 23).

Table 32 of Appendix I of Framework 23 shows that general category permit holders (IFQ and NGOM) are less dependent on scallops compared to vessels with limited access permits. In 2010, only about half (49%) of IFQ permitted vessels earned greater than 50% of their revenue from scallops. Among NGOM permitted vessels, only 31% earned more than 50% of their revenue from scallops in 2010. Scallops still comprise the largest proportion of the revenue for these general category vessels, accounting for 59% - 66% of the revenue for IFQ and NGOM vessels respectively.

The landed value of scallops by port landing fluctuated from 1994 through 2010 for many ports. During the past five years, five ports have consistently brought in the most landed value: New Bedford, MA; Cape May, NJ; Newport News, VA; Barnegat Light/Long Beach, NJ, and Seaford, VA (Table 40, Appendix I of Framework 23). In addition to bringing in the most landed value, in 1994 scallop landings represented more than 37% of the total landed value for New Bedford, MA and Cape May, NJ, and more than 65% of the total landed value for Newport News and Barnegat Light/Long Beach, NJ. This increased in 2010 to 84% and 87% for New Bedford, MA and Cape May, NJ, respectively, and 97% and 90% for Newport News and Barnegat Light/Long Beach, NJ, respectively.

The largest numbers of permitted limited access scallop vessels are currently in the ports of New Bedford, MA and Cape May, NJ, which represent 38% and 19% of the total, respectively (Table 42, Appendix I of Framework 23). In addition to having the greatest number of permitted limited access scallop vessels, New Bedford, MA also has the greatest number of general category scallop vessels. Gloucester, MA, Boston, MA, and Point Judith, RI, also have high numbers of general category scallop vessels (Table 44, Appendix I of Framework 23).

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7.0 Environmental Consequences – Analysis of Impacts

7.1 Biological Impacts

Biological impacts discussed below focus on expected changes in fishing mortality for regulated multispecies stocks. Changes in fishing mortality may result in changes in stock size. Impacts on essential fish habitat and endangered or threatened species are discussed in separate sections. Impacts are discussed in relation to impacts on regulated multispecies and other species.

7.1.1 Updates to Status Determination Criteria, Formal rebuilding Programs, and Annual Catch Limits

7.1.1.1 Revised Status Determination Criteria for Winter Flounders and Gulf of Maine Cod

Option 1: No Action

Impacts on regulated groundfish

Adoption of the No Action alternative would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be the criteria adopted in Amendment 16. These values were based on the GARM III assessments completed in 2008. Since new benchmarks assessments have been completed for these stocks, and as part of those assessments new SDCs were determined, the use of GARM III values would conflict with M-S Act requirements to use the best available science.

It is difficult to directly compare the Amendment 16 SDCs with updated biomass target values to determine the impacts if the older values are retained because of differences between the two assessments. For GB winter flounder, the No Action biomass target of SSB_{MSY} is larger than the Option 2 biomass target of B_{MSY}. Using this value as the rebuilding target would lead to larger stock sizes. This is not the case for SNE/MA winter flounder, where the No Action SSB_{MSY} is lower than the Option 2 B_{MSY} target. While difficult to make a direct comparison there may be little difference between these two values. The biomass target for GOM winter flounder would not be defined by defined by either Option 1 or Option 2. The changes in the GOM cod biomass target will not be known until the assessment is completed in December 2011.

The maximum fishing mortality thresholds are also difficult to compare because a single value actually represents a vector of a number of factors such as selectivity. The Option 1/No Action fishing mortality thresholds for the three winter flounder stocks are all numerically lower than the Option 2 values. In general, lower fishing morality thresholds should lead to higher stock sizes. In all cases, the fishing mortality thresholds are based on a proxy for F_{MSY}. This proxy is based on spawning potential. In general this is often considered a robust estimator for F_{MSY}, suggesting that it is unlikely that the proxy exceeds the actual estimate of F_{MSY} . This is not always the case, however, and it is possible that the proxy may exceed the F_{MSY} value and result in an increased risk of overfishing.

Impacts on other species

Adopting this option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. It does, however, also determine the maximum fishing mortality rates that are permissible and as a result puts a cap on catches of these species. Since the allowed catches could influence the level of fishing effort it may indirectly affect catches of monkfish, skates, and dogfish that are made while targeting these stocks. When compared to Option 2, the SDCs are generally more restrictive and would lead to lower catches and reduced interactions with these other species. All of these catches are considered when setting catch levels for the other species so it is not likely this would increase the risk of exceeding mortality targets.

Option 2: Revised Status Determination Criteria (Preferred Alternative)

Impacts on regulated groundfish

Adoption of Option 2 would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be based on the most recent benchmark assessments and would be based on the best available science, consistent with M-S Act requirements.

It is difficult to directly compare the Amendment 16 SDCs with updated biomass target values to determine the impacts if the older values are retained because of differences between the two assessments. For GB winter flounder, the Option 2 B_{MSY} target is lower than the Option 1/No Action SSB_{MSY} alternative. Using this as a biomass target would, over the long-term, lead to lower stock sizes and reduced SSB. For SNE/MA winter flounder the Option 2 B_{MSY} value is larger than the Option 1/No Action SSB_{MSY} value, but it is difficult to compare these two numbers as they measure different quantities. This option does not define a biomass target for GOM winter flounder and in that respect does not differ from Option 1.

The fishing mortality targets for GB winter flounder and SNE/MA winter flounder that would be adopted by this option are based on a direct estimate of F_{MSY}. In the case of GB winter flounder, this estimate is higher than an updated estimate of F40%, the F_{MSY} proxy used in Option 1/No Action. By adopting this mortality threshold, higher fishing mortality rates would be possible and stock sizes may be reduced when compared to Option 1/No Action.

For SNE/MA winter flounder, the Option 2 F_{MSY} value is lower than F40% for this stock. Adopting this target would lead to lower fishing mortality rate than under Option 1/No Action and as a result stock sizes would be expected to be larger over the long term.

For GOM winter flounder, Option 2 would adopt an F_{MSY} proxy that is slightly higher than that in Option 1/No Action. Over time this would allow slightly higher fishing mortalities and a slight decline in stock size.

For GOM cod, this adoption would adopt a fishing mortality and biomass targets based on results of the December 2011 assessment of this stock. These could be higher or lower than the Option 1/No Action values.

Impacts on other species

Adopting this option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. It does, however, also determine the maximum fishing mortality rates that are permissible and as a result puts a cap on catches of these species. Since the allowed catches could influence the level of fishing effort it may indirectly affect catches of monkfish, skates, and dogfish that are made while targeting these stocks. When compared to Option 1/No Action, the SDCs are generally less restrictive and would lead to increased catches and more interactions with these other species. All of these catches are considered when setting catch levels for the other species so it is not likely this would increase the risk of exceeding mortality targets.

7.1.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

Option 1: No Action

Impacts on regulated groundfish

This option would maintain the rebuilding strategy adopted for this stock in FW 45. The strategy calls for rebuilding by 2016 with a median probability of success. Assessment results from TRAC 2011 indicate that the stock cannot rebuild by 2016 even in the absence of all fishing mortality. As a result, if this strategy would be continued then fishing mortality would have to be kept as close to 0 as possible.

If fishing mortality could be successfully reduced to 0 – an unlikely event that is possible only if all U.S. and Canadian fishing activity would be prohibited – then the length of time expected to rebuild the stock can be calculated. When estimating rebuilding time, a projection is made from the most recent estimate of stock size. Because the assessment has a retrospective pattern that tends to over-estimate stock size, the projection can be run both with and without an adjustment that attempts to address these biases. Without an adjustment for the retrospective pattern, the stock would be expected to rebuild by 2017. With an adjustment for the retrospective pattern, the projection indicates the stock would be expected to rebuild by 2018. Either date is faster than would be expected if either of the sub-options in Option 2 were to be adopted.

Impacts on other species

Adopting this option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. This measure does, however, determine the amount of GB yellowtail flounder that can be harvested and thus has an indirect impact the amount of fishing activity on GB. It also influences the size of the sub-ACL of GB yellowtail flounder allocated to the scallop fishery and thus could indirectly affect scallop fishing effort on GB.

Since the most recent assessment indicates that the stock cannot rebuild by 2016 as would be called for by this option, if this option would be adopted the expectation is that GB yellowtail flounder specifications would be set at very low levels. This could reduce the amount of fishing activity on GB (or lead to the use of selective gear that does not typically catch skates, dogfish, and monkfish). Catches of those species on GB might decline as a result. Fishing effort might redirect into other areas, however, and this could lead to increased targeting of these species to make up for loss GB yellowtail flounder revenues. When compared to Option 2 (either sub-option) such re-direction of effort is more likely to occur. With respect to scallop fishing, a drastically reduced ACL would reduce the scallop fishery sub-ACL for GB yellowtail flounder. This would make it more likely that scallop fishery AMs might be triggered, reducing fishing effort on GB. While this might result in reduced fishing activity in GB by the scallop fishery, it may result in effort shifts into other areas. In addition to an increased chance that AMs are triggered under this option, if the sub-ACL is low enough, scallop allocations into GB access areas, namely Closed Area II, may need to be adjusted, allocating less effort in Closed Area II if there is not sufficient YT catch available for access area trips. When compared to Option 2, this option would introduce additional uncertainty into the prosecution of the scallop fishery and could lead to unexpected changes in scallop fishing mortality.

Option 2: Revised Rebuilding Strategy for GB Yellowtail Flounder (Preferred Alternative)

Impacts on regulated groundfish

There are two sub-options in this option, either of which would modify the rebuilding strategy for GB yellowtail flounder. The sub-options are designed to target a fishing mortality rate that will rebuild with a median probability of success by a specific data. In each case, the end date was selected to take into account the possibility that the retrospective pattern observed in the assessment in TRAC 2011 will continue and taking this into account would be expected to give a more accurate representation of future stock conditions. Either sub-option would rebuild more slowly than Option 1/No Action.

Sub-option A would be expected to rebuild the stock by 2023 with a median probability of success. This estimate is based on fishing at 75 percent of F_{MSY} (the default ABC control rule). If the retrospective pattern does not represent actual stock conditions, the stock might rebuild earlier – the projection indicates it could rebuild by 2021.

Sub-option B would be expected to rebuild the stock by 2032 with a median probability of success. This estimate is based on fishing at an F=0.21, which is the maximum mortality expected to rebuild to SSB_{MSY} and also is expected to result in an average annual increase in SSB of about 10 percent. If the retrospective pattern does not represent actual stock conditions, the stock might not rebuild earlier – the projection indicates it would still rebuild by 2032. The rebuilding trajectory is very flat at the end of the period and there are only small changes in the probability of success after 2028. The rebuilding trajectory is plotted in Figure 33.

Impacts on other species

Adopting this option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. This measure does, however, determine the amount of GB yellowtail flounder that can be harvested and thus has an indirect impact the amount of fishing activity on GB. It also influences the size of the sub-ACL of GB yellowtail flounder allocated to the scallop fishery and thus could indirectly affect scallop fishing effort on GB.

If this option would be adopted the expectation is that GB yellowtail flounder specifications would be set at higher levels than Option 1/No Action. This could increase the amount of fishing activity on GB when compared to Option 1/No Action. Catches of those species that are caught when fishing for yellowtail flounder might increase as a result. Fishing effort would be less likely to redirect into other areas, however, and this could lead to reduced targeting of these species to make up for loss GB yellowtail flounder revenues. With respect to the scallop fishery, an extended rebuilding period would lead to higher

GB yellowtail flounder sub-ACLs for this stock than those under Option 1/No Action. This would make it less likely that the sub-ACLs would be exceeded and AMs triggered than would be the case if Option 1 is adopted. Furthermore, the potential that YT bycatch limits reduce scallop fishery allocations on GB would be less likely. Therefore, scallop fishery allocations would be set based on available scallop resource and would be less likely to be constrained by potentially low YT bycatch levels under this option, compared to No Action. As a result, scallop fishing effort would occur in areas with highest scallop abundance having beneficial impacts on the scallop resource and would be more predictable having a greater chance of attaining mortality targets.

7.1.1.3 U.S./Canada Resource Sharing Understanding TACs

Option 1: No Action

The biological impacts of the No Action Alternative would be mainly positive. The No Action Alternative would not specify U.S./Canada TACs, and as a result, there would be less fishing in the U.S./Canada Management Area. Consistent with the regulations, if no TACs were specified for the U.S./Canada stocks, the Eastern U.S./Canada Area would be closed to all limited access NE multispecies vessels, and harvesting, possessing, or landing these stocks would be prohibited for all vessels. As a result, fishing mortality of these stocks would be minimal and the stock rebuilding times may be shortened.

Option 2: U.S./Canada TACs (Preferred Alternative)

The proposed TACs are at levels that correspond to the fishing mortality rates consistent with the management strategy agreed to under the Understanding as well as the recommendations of the SSC for GB yellowtail flounder. Under the Understanding, the strategy is to maintain a low to neutral risk of exceeding the fishing mortality limit reference (F_{ref} = 0.18, 0.26, 0.25, for cod, haddock, and yellowtail flounder, respectively), and when stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. The recommended 2012 TACs for cod, haddock, and yellowtail flounder were based upon the most recent stock assessments (TRAC 2011). The 2012 TACs for Eastern GB cod and haddock, and GB yellowtail flounder, were recommended by the TMGC, based upon the fishing mortality strategy shared by both the United States and Canada. The full justification for the proposed TACs is described in Section 4.1.3.2 of this EA.

Based on catch information for the U.S./Canada Management Area from FY 2004 through FY 2010, management measures have generally restrained catches of Eastern GB cod and haddock and GB yellowtail flounder below their respective TACs. However, in FY 2007, catch of GB yellowtail flounder exceeded the TAC by nine percent due to late reporting and because yellowtail catch by the scallop fishery was not accounted for until after the end of the fishing year. The GB yellowtail TAC was exceeded by nine percent again in FY 2009 as a result of increases to the catch rate late in the fishing year. The TAC in the subsequent fishing year was reduced following both the overage in FY 2007 and FY 2009. In addition, the monitoring methodology has been modified to provide for more accurate in-season monitoring of the U.S./Canada TACs. Based upon preliminary information, NMFS does not anticipate that the TACs for Eastern GB cod, Eastern GB haddock, or GB yellowtail flounder will be exceeded in FY 2011.

Although it is not possible to separate out the precise impact of the hard TACs on the overall pattern of fishing behavior and landings, the TACs and associated regulations have played an important role in determining fishing patterns on GB, as further explained in the Economic Impacts of the Preferred Alternatives for U.S./Canada TACs. Because the proposed TACs are based upon fishing mortality rates that are in accordance with the Understanding and the FMP, and the management measures that are associated with the U.S. Canada Management Area have effectively controlled fishing effort, the proposed TACs are appropriate and will contribute toward the growth of the GB cod and yellowtail flounder stocks, and the maintenance of the GB haddock stock. Substantive changes in fishing behavior as a result of sector management, increased observer coverage in the fishery, and improved monitoring methods likely contribute to a reduced risk of exceeding the U.S./Canada TACs when compared to fishing years prior to FY 2010. Therefore, the biological impacts of this alternative would likely be positive, though these positive impacts would be expected to be less than the positive impacts under the no action alternative.

A delay in the opening of the Eastern U.S./Canada Area for common pool vessels fishing with trawl gear in FY 2012 until August 1, 2012, would likely reduce the chance that the Eastern GB cod TAC for common pool vessels would be exceeded. This measure delays access to the area to prevent trawl fishing during the time when cod catch is relatively high.

FY 2012 will be the third year the FMP has operated under the revised sector regulations, and a high percentage of active vessels are expected to participate in sectors. Since trip limits only apply to common pool vessels now, this management measure would play a reduced role in the in-season management of catch. Sectors would continue to have more choices regarding fishing strategy in the U.S./Canada Management Area.

7.1.1.4 Administration of Scallop Fishery Sub-ACLs

Any of the options may be adopted and all are compared to No Action.

Option 1: No Action

Impacts on regulated groundfish

If Option 1/No Action is implemented there would not be any changes to the way scallop fishery sub-ACLs are administered. Under this option, when a sub-ACL is caught the AMs that apply to the scallop fishery are implemented. The particular AMs are specified by the Atlantic Sea Scallop FMP. The AMs are implemented without regard to whether other components have caught their allocation and without regard to whether the overall ACL is exceeded.

Under this option, the concept is that fishing mortality is partitioned to each subcomponent by allocating a portion of the ACL. Each subcomponent is then held to its allocation through the implementation of measures, including AMs. As a result, this option would have less risk of overfishing than Option 2 because AMs would be triggered on the scallop fishery if that sub-ACL were exceeded, regardless of whether or not the total ACL was exceeded.

Impacts on other species

If Option 1/No Action is adopted there would not be expected to be any direct impacts on other species. This measure is primarily administrative in nature. It is possible that with this option there is more of a chance the scallop fishery AMs will be triggered to account for catches of yellowtail flounder. This could redirect scallop fishing effort out of the AM areas which may in turn result in changes to their catches of monkfish, skates, and scallops.

The primary impact would likely be on scallop catches if this were to occur. The increased likelihood that an AM might be triggered creates additional uncertainty on the location of scallop fishing activity. In terms of scallop management, this makes it more difficult to determine the appropriate effort levels necessary to achieve mortality targets if effort is shifted to an area with lower scallop catch rates. This complicates scallop management and could result in exceeding scallop mortality targets. This is more likely to occur under this option than if Option 2 is adopted.

Option 2: Changes to Scallop Fishery Sub-ACL Administration (Preferred Alternative)

Impacts on regulated groundfish

If Option 2 is adopted, then scallop fishery catches of groundfish stocks would continue to be compared to the sub-ACLs, but the AM would only be triggered if the overall ACL was exceeded or the scallop fishery sub-ACL was exceeded by 50 percent or more. As a result, in any given year it is possible that the scallop fishery might exceed its sub-ACL, but AMs would not be triggered if total catches did not exceed the overall ACL or the overage was less than 50 percent of the sub-ACL. Since the purpose of AMs is to prevent overfishing, this option only implements the scallop fishery AMs when – based on catches exceeding the ACL – overfishing is more likely to have occurred.

In any single year there is little difference in the biological impacts of this approach to administering the sub-ACL and Option 1/No Action. Fishing mortality on stocks with a scallop fishery sub-ACL might be marginally higher than under Option 1. This is because the limits on the scallop fishery catches are not as restrictive as would be the case under Option 1 where the only criterion for implementing AMs is whether the scallop fishery sub-ACL is exceeded. Since the AMs on the scallop fishery are only triggered if the overall ACL is exceeded or the overage is 50 percent or more the scallop fishery could exceed its sub-ACL and exceed its portion of the fishing mortality. Catches would thus be higher than if the scallop fishery catch was kept to its sub-ACL, and fishing mortality would be higher. But this would not likely lead to overfishing as AMs would be triggered if the overall ACL was exceeded and generally the ACLs are set well below the OFL (this may change for SNE/MA windowpane flounder if the MSE is adopted for this stock).

Over the longer term, this option may have a greater risk overfishing. If scallop fishery catches exceed the sub-ACL, then the only way the AMs are not triggered would be if other fishery components do not catch their allocations. If this happens AMs would not be automatically implemented to limit scallop catches to the sub-ACL. As a result scallop fishery catches would be expected to exceed the sub-ACL in the following year as well. If other components increase their catches to their allocations in the following year overfishing will occur. The only exception would be if the scallop fishery overage was 50 percent or more, in which case AMs would be implemented. As a result there may be less stringent controls on the scallop fishery catches of groundfish stocks with a sub-ACL than is the case if Option 1 is adopted.

Impacts on other species

If Option 2 is adopted there would not be expected to be any direct impacts on other species. This measure is primarily administrative in nature. With this option there is less of a chance the scallop fishery AMs will be triggered to account for catches of yellowtail flounder. This makes the location of scallop fishing activity more predictable and reduces potentially negative impacts on the scallop resource from effort shifts caused by YT flounder AMs being triggered. In terms of scallop management, this option reduces the ability to shift effort making it easier to determine the appropriate effort levels necessary to achieve mortality targets compared to Option 1.

Option 3: In-Season Re-Estimation of Scallop Fishery GB Yellowtail flounder Sub-ACL (Preferred Alternative)

Impacts on regulated groundfish

This option would re-estimate the GB yellowtail flounder sub-ACL for the scallop fishery based on data from the current fishing year. If the data show that less than 90 percent of the sub-ACL will be caught the sub-ACL would be re-specified and the underage made available to the groundfish fishery. This measure might result in increased catches of GB yellowtail flounder than would be the case under Option 1/No Action. This is because any underage shifted to the groundfish fishery would be likely to be caught, unlike Option 1 where it would not be caught. Fishing mortality rates for GB yellowtail flounder would likely to be closer to the target rates, but would not be expected to exceed the overfishing level.

Impacts on other species

When compared to Option 1/No Action this measure might lead to increased catches of skates, dogfish, and other species that are caught while fishing for yellowtail flounder on GB. It would not be expected to threaten mortality targets for those stocks since they are also subject to ACLs and AMs designed to prevent overfishing.

7.1.1.5 Annual Catch Limit Specifications

Option 1: No Action

Impacts on regulated groundfish

This option would maintain the specifications (OFLs/ABC/ACLs) for FY 2012 at the same levels as adopted by FW 44 and FW 45. It would also maintain the distribution of the catches to various fisheries sub-components. If this option would be adopted, the specifications would only be identified for FY 2012 for all stocks except pollock. The specifications would not reflect the recent assessments of the three winter flounder stocks, GB yellowtail flounder, and GOM cod.

This option would define the Overfishing Level (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limits (ACLs) for the multispecies fishery. The OFLs are based on an estimate of stock size and $F_{MSY.}$ The ABCs are reduced below the OFL and are based on a control rule for each stock. These control rules were identified in Amendment 16. In most cases, the ABC is based on a fishing mortality of either 75 percent of F_{MSY} or an $F_{rebuild}$, whichever is lower. The ABC is thus below the OFL and if catches are kept at or below the ABC, overfishing is unlikely to occur. The ACL is set lower than the ABC to account for management uncertainty. The ABCs – and thus the ACLs - that are specified for FY 2010 through FY 2012 are based on the fishing mortality targets adopted by Amendment 16. These targets were designed to end overfishing and to rebuild groundfish stocks consistent with the requirements of the M-S Act and the Council's rebuilding goals. The ABCs were set by the Science and Statistical Committee

(SSC). In all cases the ACL is lower than the ABC. The calculation of these values was described in detail in appendices to FW 44 and 45.

If the ACL is approached or exceeded, accountability measures (AMs) are triggered that are designed to either prevent or end overfishing. The exact AM that is used depends on the component of the fishery and the fishing year, as Amendment 16 adopted different AMs for different components and fishing years.

In previous action, for stocks that have an age-based assessment and an age-based projection model the impacts on stock size of setting the ABCs were estimated using short-term projections. These project the estimated median stock size expected to result by limiting catches to the ABC. While these projections are based on the scientific advice of the GARM III and TRAC panels, the SSC, and the Groundfish Plan Development Team, projections are subject to uncertainty and future stock size may differ from the trajectories that were calculated. Recent work by NEFSC scientists and the Council's SSC raised concerns that medium-term projections (defined as 4- 6 years forward from the terminal year of the assessment) are typically biased high – that is, stock size increases are over-estimated and as a result future fishing mortality rates are under-estimated. Because of these concerns short-term projection results are not shown for the twelve stocks that have not been re-assessed since 2008 (GARM III, terminal year of 2007). These stocks are:

- GB cod
- GOM cod (assessment scheduled for December 2011)
- GB haddock
- GOM haddock
- CC/GOM yellowtail flounder
- SNE/MA yellowtail flounder
- Witch flounder
- Plaice
- Redfish
- White hake
- Atlantic halibut
- Atlantic wolffish

The ABCs and ACLs for these stocks are believed to be set at levels that have less than a median risk of overfishing. When first adopted the probability of overfishing these stocks in FY 2012 if catch was equal to the ABC was estimated to be no more than 20 percent (Table 54). There is considerable uncertainty in these estimates given the age of the assessments. For GB, GOM, and SNE/MA winter flounder and GB yellowtail flounder, recently completed assessments allow for using short-term projections to estimate the probability of overfishing for the Option 1/No Action ABCs in FY 2012. These values are included in Table 54. The value shown for GB yellowtail flounder does not take into account that the most recent assessment exhibits a retrospective pattern. If this patter were to persist then overfishing would be almost certain to occur in FY 2012 at the Option 1/No Action catch level.

With respect to pollock, one source of uncertainty in the assessment highlighted by assessment reviewers was the selectivity in the survey and the fishery: "The ASAP model with dome-shaped survey and fishery selectivity implies the existence of a large biomass (35 – 70% of total) (i.e. cryptic biomass) that neither current surveys nor the fishery can confirm" (NEFSC 2010). Further the review panel advised "The projections of stock biomass are appropriate if the survey and fishery selectivity assumptions are true. However, density dependent influences on recruitment could become an issue if flat-topped survey selectivity is true but a domed selectivity was used to undertake the projections…The Panel recommends that it would be useful when making stock projections to more explicitly formulate the consequences to the pollock stock of different model assumptions in a decision table similar to that employed in risk assessment." (O'Boyle, pers. comm.)

FW 45 included a lengthy discussion of the differences between the approved pollock assessment model and a sensitivity run that assumed flat-topped selectivity in the survey, but continues to use dome-shaped selectivity in the fishery. This reduces stock size estimates by about 30 percent. This model formulation can be used to explore the impact of the selectivity assumption on the probability of overfishing and the probability of being overfished. *It is important to note this is not the model formulation accepted by the review panel.* Nor does this model account for all elements of model uncertainty; for example, it does not incorporate flat-topped selectivity in the fishery. But it does provide some indication of the effects of the dome-shaped selectivity pattern on catches and future stock size. It should be noted that the choice of the selectivity pattern affects the estimate of SSB_{MSY}. The approved model results in an SSB_{MSY} of 91,000 mt, so the stock is overfished if biomass is less than 45,500 mt. The alternative sensitivity run results in an SSB_{MSY} estimate of 58,000 mt, in which case the stock would be considered overfished if less than 28,000 mt.

If the dome shaped selectivity is true, there is little risk of overfishing or being overfished through 2015 under the proposed ABCs. If the dome is false, the Option 1 ABCs are likely to result in overfishing. If the dome is false the proposed ABC has a medium risk of reducing stock size to less than 45K mt by 2015, but a low risk reducing stock size to less than 29K mt by 2015. There is no difference for this stock between Option 1/No Action and Option 2 – the ABCs are the same.

With respect to GOM cod, this option would not consider the results of an assessment scheduled for December 2011. As a result there is doubt whether the specifications that would be adopted by this option would achieve the mortality targets for this stock. Only if the assessment results exactly match the projections from GARM III would the probability of overfishing match that shown in Table 54.

For the three index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC can be compared to the most recent estimates of stock size to determine of the exploitation index will exceed the overfishing level <u>if stock size does not change</u>. This is an unrealistic assumption but past efforts to use the index projection model with these stocks have proven unreliable. There are also uncertainties in these analyses caused by the recent change in the research vessel used for the trawl survey and the strata that are covered by the survey. The new research vessel does not survey the same strata as the old vessel; this may affect both stock size estimates and reference point calculations for stocks assessed with an index. Table 55 summarizes these results. For all three stocks, overfishing would not be expected to occur at the Option 1/No Action ABCs for FY 2012. The exploitation index for ocean pout would be expected to exceed the default ABC control rule of 75% of F_{MSY}. Because ocean pout stock size has been declining it is possible that this ABC would lead to overfishing if stock size continues to decline.

To summarize, the Option 1/No Action ABCs, if caught, would be almost certain to result in overfishing of GB yellowtail flounder. Ocean pout fishing mortality might also exceed the F_{MSY} proxy if the stock continues to decline. The ABCs would not be likely to result in overfishing of any of the three winter flounder stocks or pollock. For GOM cod the proposed ABC might not be consistent with the results of an assessment scheduled for December 2011. For the remainder of the stocks there is uncertainty over the accuracy of medium term projections but overfishing would not be expected to occur based on those results. The main differences between this option and Option 2 are the expected impacts on GB yellowtail flounder, ocean pout, and GOM cod.

Table 54 - Probability that overfishing occurs ($F>F_{MSY}$) if catch is equal to ABC

Species	Stock	2010	2011	2012
Cod	GB	0.118	0.153	0.170
Cod	GOM	0.133	0.148	0.159
Haddock	GB	0.027	0.020	0.018
Haddock	GOM	0.003	0.013	0.014
Yellowtail Flounder	GB			0.929
Yellowtail Flounder	SNE/MA	0.000	0.001	0.046
Yellowtail Flounder	CC/GOM	0.035	0.040	0.051
American Plaice	GB/GOM	0.003	0.019	0.057
Winter Flounder	GB			0.004
Winter Flounder	SNE/MA			0.000
Winter Flounder	GOM			0.000
Pollock				0.00
Witch Flounder		0.078	0.123	0.150
Redfish		0.000	0.000	0.000
White Hake (1)	GB/GOM			
Windowpane (1)	GOM/GB			
Windowpane(1)	SNE/MA			
Ocean Pout(1)				
Atlantic Halibut(1)				

(1) Assessment/projection model does not allow calculation of probability of overfishing

Table 55 – Exploitation index if FY 2012 ABC is applied to most recent stock size estimate

Stock	Stock Size (3-year survey avg)	ABC/Stock Size	Percent of F_{MSY}
GOM/GB windowpane	0.4608	0.367	73.4%
SNE/MAB windowpane	0.3512	0.675	46%
Ocean pout	0.4153	0.76	86%

Impacts on other species

Adopting the Option 1/No Action specifications is not expected to have direct impacts on non-groundfish species. Indirect effects are generally likely to be beneficial. The specifications, when combined with the AMs adopted by Amendment 16, could reduce groundfish fishing activity. Catches of other species that occur on groundfish trips would decline as a result. There are only limited opportunities for groundfish vessels to target other stocks in other fisheries, so the shifting of effort into other fisheries is not likely to occur on a large scale. These other fisheries will also have ACLs and AMs so while such effort shifts may have economic effects the biological impacts should not be negative. There are some differences in the groundfish catch levels under this option than in Option 2: GB winter flounder, GOM winter flounder are lower, SNE/MA winter flounder is higher, and GOM cod may be higher. These differences are not likely to result in a large difference in fishing effort, so it is not likely that this option will have biological effects on other species that are noticeably different from Option 2.

Option 2: Revised Annual Catch Limit Specifications (Preferred Alternative)

Option 2 would adopt new ABCs for the three winter flounder stocks, GB yellowtail flounder, GOM cod, and the three stocks assessed with a survey index. The ABCs for other stocks are the same as in Option 1/No Action and so these impacts are not summarized again.

Because this option would adopt FY 2012 -2014 ABCs for GB winter flounder, SNE/MA winter flounder, and GB yellowtail flounder, and all three stocks have recent assessment updates, short-term projections can be used to estimate the probability of overfishing and short-term changes in stock size. These projections use catches equal to the ABCs that would be adopted f this option is selected. Since the management goal is to keep catches at or below ACLs, and ACLs are always less than the ABC, the projection results would be expected to slightly over-estimate the risk of overfishing and under-estimate future stock size. Projected stock sizes are shown in Figure 31 through Figure 33 for these three stocks and the risk of overfishing is listed in Table 56. There is less probability of overfishing SNE/MA winter flounder with this option than with Option 1, but a greater probability of overfishing GB winter flounder and GOM winter flounder. For both of these stocks the probability is less than 25 percent and the risk of overfishing would be considered low.

With respect to GB yellowtail flounder there is additional uncertainty in the short-term projection because the most recent assessment shows a retrospective pattern that over-estimates stock size and under-estimates fishing mortality in the terminal year of the assessment. The approved assessment model does not explicitly account for this uncertainty. Short term projections can be calculated that do account for the retrospective pattern. This sensitivity analysis can be compared to the results without accounting for the retrospective pattern. As plotted in Figure 33, projected stock size if the retrospective pattern continues indicates that the stock will be about half the size expected if the retrospective pattern does not continue. Similarly, if the retrospective pattern is considered then the risk of overfishing in FY 2012 and 2013 is much higher than if it is not. The approved assessment model does not adjust for the retrospective pattern.

This option would adopt an ABC for GOM cod that is within the range of 500 – 20,000 mt and that is consistent with the results of an assessment that scheduled for completion in December 2011. The ABC would be selected to be consistent with current stock status and rebuilding requirements. Unlike Option 1/No Action, because the ABC will be based on new information there is more certainty that the ABC and other specifications will achieve the desired mortality targets.

The ABCs for the index-based stocks are all based on the default ABC control and apply the control rule to current stock size. When compared to Option 1, allowed catches would be lower for ocean pout, higher for SNE/MA windowpane flounder, and about the same for GOM/GB windowpane flounder. None of the allowed catches would be expected to exceed the F_{MSY} proxies for these stocks.

To summarize the differences between Option 2 and Option 1/No Action, unlike Option 1 none of the ABCs that would be adopted under this action would have a high probability of resulting in overfishing, if caught. For some stocks (GB winter flounder, GOM winter flounder, SNE/MA windowpane flounder) the ABCs under this option are higher than in Option 1 and would be expected to result in higher fishing mortality but would not be expected to exceed mortality targets. Option 2 would also be expected to adopt specifications for GOM cod that are more likely to be consistent with current stock status than would be the case under Option 1/No Action.

Table 56 – Estimated probability of overfishing if catch is equal to ABC

Species	Stock	2012	2013	2014
Yellowtail Flounder	GB	0.042	0.008	
Yellowtail Flounder	GB Retro. Adj.	0.969	0.783	
Winter Flounder	GB	0.159	0.193	0.214
Winter Flounder	SNE/MA	0.000	0.000	0.000
Winter Flounder	GOM	~0.100	~0.100	~0.100

Figure 31 – Projected SNE/MA winter flounder stock size

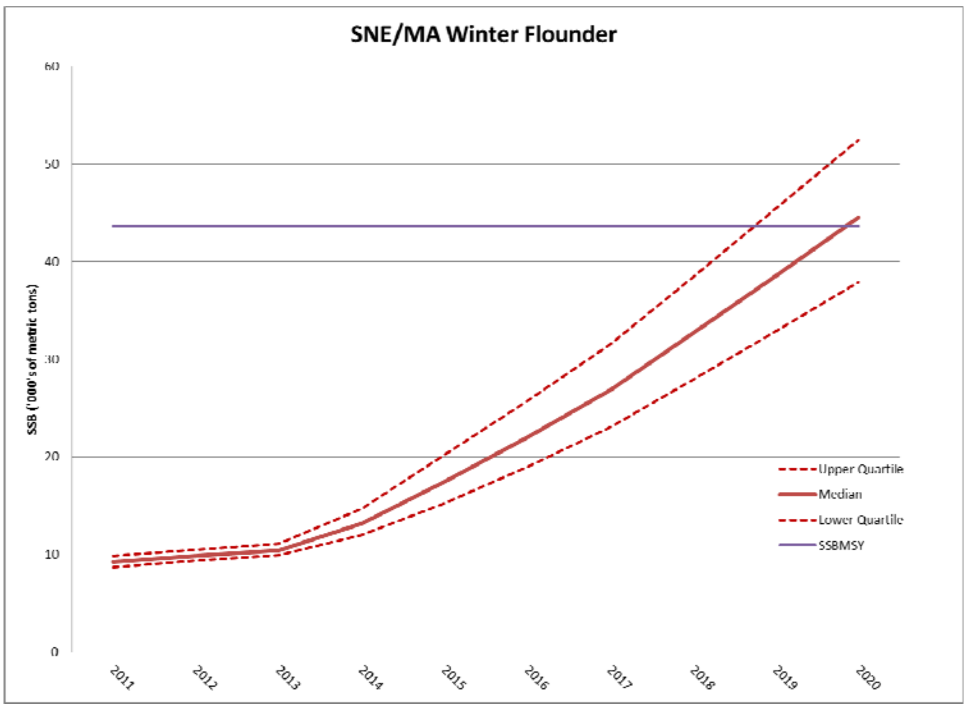


Figure 32 – Projected GB winter flounder stock size

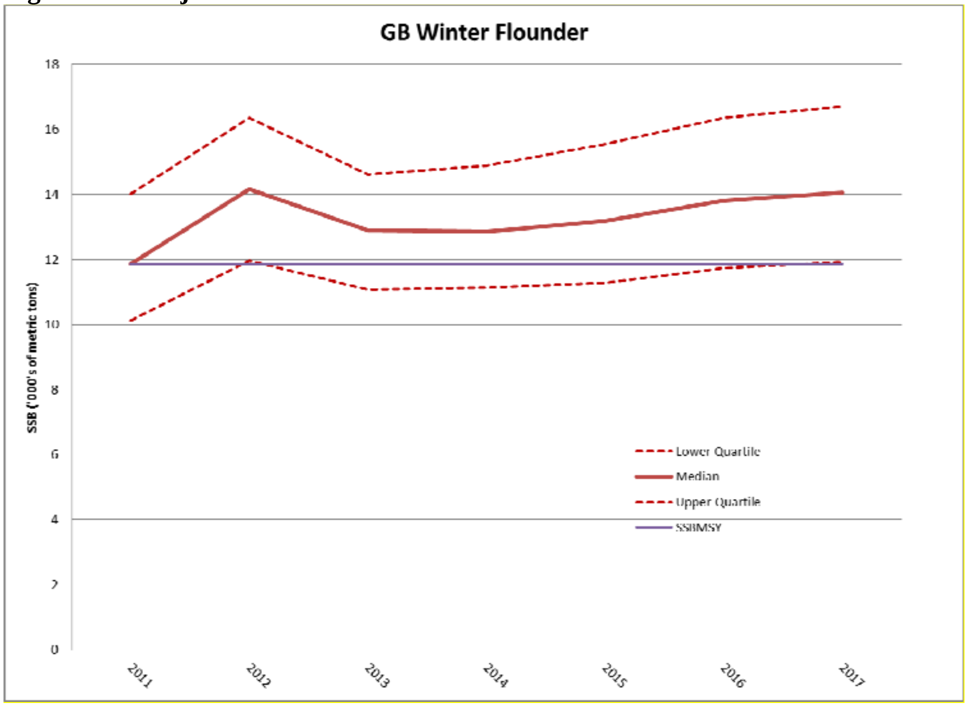
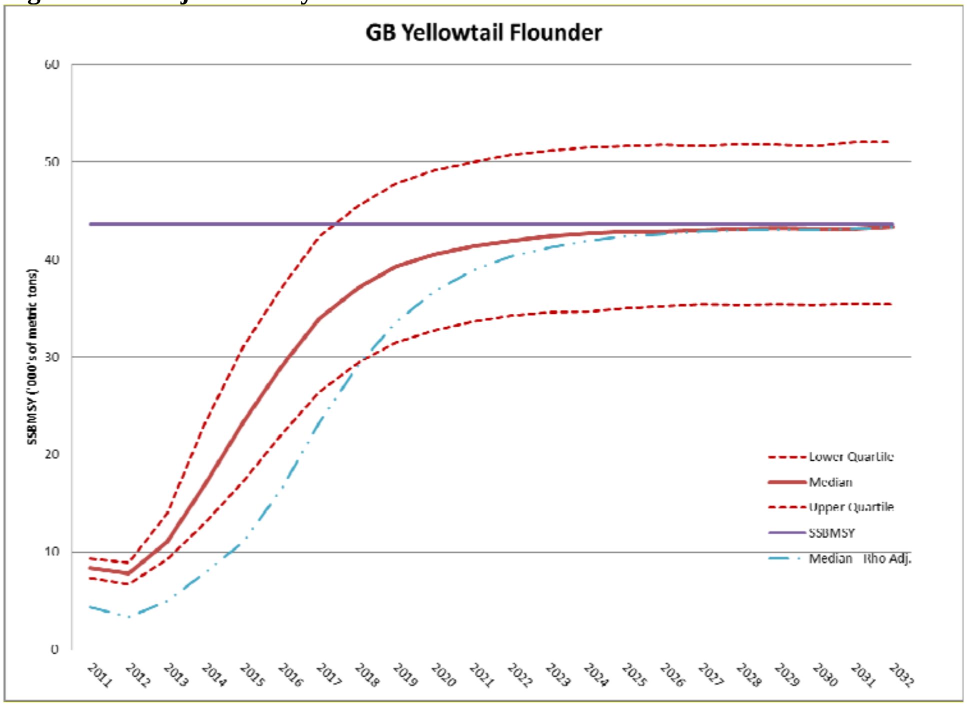


Figure 33 – Projected GB yellowtail flounder stock size



Impacts on other species

Adopting the Option 2 specifications is not expected to have direct impacts on non-groundfish species. Indirect effects are generally likely to be beneficial. The specifications, when combined with the AMs adopted by Amendment 16, could reduce groundfish fishing activity. Catches of other species that occur on groundfish trips would decline as a result. There are only limited opportunities for groundfish vessels to target other stocks in other fisheries, so the shifting of effort into other fisheries is not likely to occur on a large scale. These other fisheries will also have ACLs and AMs so while such effort shifts may have economic effects the biological impacts should not be negative. There are some differences in the groundfish catch levels under this option than in Option 2: GB winter flounder, GOM winter flounder are higher, SNE/MA winter flounder is lower, and GOM cod may be lower. These differences are not likely to result in a large difference in fishing effort, so it is not likely that this option will have biological effects on other species that are noticeably different from Option 1/No Action.

7.1.2 Commercial and Recreational Fishery Measures

7.1.2.1 Management Measures for SNE/MA Winter Flounder

Option 1: No Action (Preferred Alternative)

Impacts on regulated groundfish

Landings of SNE/MA winter flounder would continue to be prohibited under this option. Because landing is prohibited there would likely be little groundfish fishing for this stock or other stocks that are caught with SNE/MA winter flounder. There is some evidence from SARC 52 what the biological impacts would likely be. The prohibition on landing this stock has been in effect for all of 2010 and eight months of 2009. Catches were well below the groundfish sub-ACL in FY 2010, with only 9 percent of the sub-ACL caught. According to SARC 52 the fully-recruited fishing mortality for those two years was 0.09 in 2009 and 0.05 in 2010, well below the overfishing level of 0.29. The expectation is that fishing mortality would continue to be low if this measure is adopted, contributing to rebuilding of this stock.

This measure would indirectly affect the ability to assess this stock by reducing the number of fish that can be obtained for biological sampling by port agents. Over time this would result in a decreased understanding of changes in the stock and would increase assessment uncertainty.

Impacts on other species

- With respect to the commercial fishery this option (when compared to Option 2) would be expected to influence fishing effort for both sector and common pool vessels. The effects are likely to differ by area depending on what other groundfish fishing opportunities are available. For example, in coastal areas south of New England, the major groundfish species are yellowtail flounder and winter flounder, with cod sometimes available in the late winter/early spring. Because this measure prohibits landing winter flounder it would likely lead to reduced groundfish fishing effort in those areas. As a result catches of other species that are made on groundfish trips would likely also decrease. Counteracting these reductions might be shifts in effort to other species to make up for the lost groundfish revenue. In the Great South Channel and east of Cape Cod there are other species available and thus this measure might influence the type of gear used but would not be likely to affect overall effort. With respect to the recreational fishery this option might result into a redirection of effort onto other target species, probably fluke.

In the Great South Cannel and east of Cape Cod there are other species available and thus this measure might influence the type of gear used but would not be likely to affect overall effort.

With respect to the recreational fishery this option might result into a redirection of effort onto other target species, most likely fluke.

Option 2: Allocate SNE/MA winter flounder to the fishery

Impacts on regulated groundfish

If adopted, this option would allow the landing of SNE/MA winter flounder by both common pool and sector vessels. Catches would still be limited to the ACL that was established and in particular the groundfish fishery would be limited to its sub-ACL. Because landing would be allowed, however, it would be expected that catches would increase when compared to Option 1/No Action and would probably exceed the 9 percent of the sub-ACL caught in FY 2010. Fishing mortality would likely increase when compared to Option 1/No Action but would not be expected to exceed the target fishing mortality used to establish the ABC. This is well below the OFL and it is unlikely that this option would result in overfishing.

An indirect biological impact of this option is that allowing landing of this stock will provide increased opportunities for biological sampling of the catch. Information that is collected will be used as inputs to future assessments. When compared to Option 1/No Action more information will be available for the assessments and there may be an improvement in the quality of future assessments as a result.

Impacts on other species

With respect to the commercial fishery this option (when compared to Option 1) would be expected to influence fishing effort for both sector and common pool vessels. Groundfish effort would be expected to target winter flounder if this measure was adopted. This could lead to increased catches of some species that are caught with winter flounder but might also move effort away from dogfish, skates and monkfish. Recreational fishermen might also reduce catches of other species as they target winter flounder, but the federal recreational fishery is a small component of catches and any impacts are not likely to be noticeably different than those under Option 1.

7.1.2.2 Scallop Catch of Yellowtail Flounder in GB Access Areas – Modification of Restrictions

Option 1: No Action

Impacts on regulated groundfish

If adopted, scallop fishery catches of GB and SNE/MA yellowtail flounder in the CAI, CAII, and NLCA access areas would continue to be limited to 10 percent of the ACL of the relevant stock. This would not limit the potential total catches of yellowtail flounder by the scallop fishery but it would limit the amount of the sub-ACL that is taken within closed areas.

The stocks most affected by this measure are GB yellowtail flounder and SNE/MA yellowtail flounder. If adopted, this option would make sure that no more than 10 percent of the ACL is harvested by scallop vessels within the access areas. This would help spread the scallop fishery catches over the entire stock area. Because this measure could constrain scallop fishing effort within the access areas, it may also reduce catches of other groundfish stocks within these areas. Generally scallop vessels only harvest flatfish in appreciable quantities, so for groundfish species the measure would help limit mortality on winter flounder, plaice, and witch flounder. There would be little impact on cod or haddock.

The measure would not, however, limit the overall catch of these two stocks because it does not change the overall sub-ACL allocated to the scallop fishery. So while there may be benefits in spreading the harvest of yellowtail flounder by this fishery over a broader area, unless fish in the area are significantly larger than those outside the area there would not likely be any difference in fishing mortality between this option and Option 2. If the fish are larger in the access area, the larger the weight of fish harvested outside the area the greater the impact on fishing mortality since mortality is based on the numbers of fish caught, not the total weight. As a result, this option would lead to a higher fishing mortality for a given sub-ACL than Option 2. Whether this would lead to exceeding mortality targets depends on how accurately selectivity is incorporated into the ACLs and how large the difference is between open and access areas.

Impacts on other species

This option could have direct impacts on the catches of scallops on GB and the SNE area. Under the Option 1/No Action measure there is a cap in the amount of GB yellowtail flounder that can be caught by the scallop fishery when fishing in the CAI and CAII access areas. There is also a cap on the amount of SNE/MA yellowtail flounder that can be caught in the NLCA access area. On several occasions the cap has been exceeded and as a result the access areas have been closed before the available scallop yield was harvested. This shifts the remaining scallop fishing effort into open areas. If the scallops are smaller in the open areas than in the access areas more scallops are caught for a given weight of harvest, leading to higher scallop fishing mortality than was expected. This result is more of a possibility under this option than would be the case if Option 2 is adopted. In addition, if scallop catch rates are lower in open areas compared to access areas it will take vessels longer to catch the same amount of scallops, so the time gear is fishing could be longer. Increased bottom time can have negative impacts on bycatch if bycatch species are distributed similarly in open areas.

Option 2: Eliminate cap on yellowtail flounder caught in the GB access areas (Preferred Alternative)

Impacts on regulated groundfish

This option would potentially allow the entire scallop fishery sub-ACL for either SNE/MA or GB yellowtail flounder to be caught in the CAI, CAII, or NLCA access areas. These sub-ACLs generally are in the range of 5 to 30 percent of the overall ACL. This measure could result in more of the catch of these two stocks being caught in a relatively small part of the stock area, and possibly during a narrowly defined part of the year since the access areas are not open year-round at present. The biological impacts of these localized catches are uncertain. If fish in the closed areas are larger than fish outside the closed areas, than for a given weight of a sub-ACL fewer fish may be caught under this option than under Option 1/No Action, resulting in a lower fishing mortality. But whether this will be noticeable depends on just how large the differences are between fish inside and outside the access areas. Fishing in the access areas is generally prohibited during times when yellowtail flounder are expected to spawn, whereas activity outside the areas is not restricted. So if more of the sub-ACL is taken inside the access areas than would occur under Option 1/No Action there may be less fishing on spawning fish. In the end, since there is still an overall limit, or sub-ACL, on the amount of YTF the scallop fishery can catch the ultimate impact of this option is minimal since the fishery would still have an overall limit.

Impacts on other species

This option could have direct impacts on the catches of scallops on GB and the SNE area. Under the measure there would not be a cap (other than the overall sub-ACL) on the amount of GB yellowtail flounder that can be caught by the scallop fishery when fishing in the CAI and CAII access areas or SNE/MA yellowtail flounder in the NLCA access area. As a result it is more likely that the entire available scallop yield that was planned for will be harvested in the access area, where scallops are usually larger and more concentrated. This makes it more likely that fishing activity will reflect the planned distribution of effort and will increase the probability that scallop mortality targets will be achieved.

7.1.2.3 Atlantic Wolffish Landing Limit

Option 1: No Action (Preferred Alternative)

Impacts on regulated groundfish

If this option is adopted possession of Atlantic wolffish would continue to be prohibited. Both recreational and commercial fishermen would be required to return fish to the sea with a minimum of harm. This measure reduces the incentive to target Atlantic wolffish, reducing fishing mortality, but this species is not typically caught in large enough quantities that active targeting is common. Those fish that are incidentally caught would also not be retained and some would be expected to survive. Grant et al. (2005) conducted experiments to determine the survivability of wolffish caught in the yellowtail flounder trawl fishery on the Grand Banks. These experiments demonstrated that wolffish returned to the sea within 1-2 hours had survival rates exceeding ninety percent; if returned to the sea after two hours, survival rates rapidly declined. This measure would thus be expected to reduce fishing mortality of Atlantic wolffish when compared to Option 2. One indirect impact of this measure is that it compared to

Option 2 it reduces the number of wolffish that are landed. This means little fishery dependent data is available to monitor the condition of this stock, making future assessments more uncertain.

Impacts on other species

Since wolffish is a minor component of the catch for groundfish fishing vessels this measure is not likely to result in any changes in groundfish fishing effort and is unlikely to have noticeable impacts on other species caught while targeting groundfish. There is no difference between this option and Option 2.

Option 2: Revised Atlantic Wolffish Possession Limit

Impacts on regulated groundfish

If this option is adopted, commercial fishing vessels would be allowed to retain one Atlantic wolffish. Recreational fishing vessels would not be allowed to retain any Atlantic wolffish. The impacts of this measure, when compared to Option 1/No Action, would be expected to be a slight increase in Atlantic wolffish fishing mortality. This is because a small number of Atlantic wolffish that would be discarded if Option 1 was adopted –some of which would be expected to survive - might be retained and none of these fish would survive. Any impacts on fishing mortality are likely to be slight and probably undetectable. In contrast to Option 1/No Action, more fish would be available for biological sampling and the ability to monitor the stock would be improved.

Impacts on other species

Since wolffish is a minor component of the catch for groundfish fishing vessels this measure is not likely to result in any changes in groundfish fishing effort and is unlikely to have noticeable impacts on other species caught while targeting groundfish. There is no difference between this option and Option 1.

7.1.2.4 Common Pool Restricted Gear Areas

Option 1: No Action

Impacts on regulated groundfish

If this option is adopted the common pool restricted gear areas (RGAs) adopted in Amendment 16 would remain in effect. These areas and the applicable regulations are described in section 4.2.4. The RGAs were implemented primarily to reduce catches of several flatfish species by requiring the use of gear that typically is not effective at catching them. The areas were positioned to reduce catches of SNE/MA winter flounder, SNE/MA yellowtail flounder, SNE/MAB windowpane flounder, witch flounder, and plaice. Based on NMFS estimates of common pool catches in FY 2010, the areas may have helped reduce fishing mortality for SNE/MA winter flounder and SNE/MA yellowtail flounder. Common pool catches were only 25.9 percent of its allocation of SNE/MA yellowtail flounder, and total groundfish fishery catches of SNE/MA winter flounder were only 9.1 percent. There is some indication, however, that this measure is not as effective as might be expected based on the requirements adopted in Amendment 16. Section 6.5.5 describes fishing activity in the areas and it is apparent that compliance with this measure is poor. When compared to Option 2, this measure would be expected to reduce fishing mortality for several groundfish stocks even if compliance is weak.

Impacts on other species

The Option 1/No Action RGAs affect groundfish fishing activity by common pool vessels in certain defined areas. The gears that are required typically have reduced catches of bottom-dwelling species and would be expected to reduce catches of monkfish, skates, and dogfish while fishing on groundfish trips. Conceptually the expected result would be reduced fishing mortality for these species that would result from groundfish fishing activity. Common pool vessels represent only a small part of the fishery, however, so it is not likely these impacts would be noticeably different from the impacts of Option 2. This is particularly true given the information in section 6.5.5 that suggests that compliance is poor.

Option 2: Removal of Common Pool Restricted Gear Areas (Preferred Alternative)

Impacts on regulated groundfish

This Option would remove the restricted gear area provisions adopted by Amendment 16 and described in section 4.2.4. When compared to Option 1/No Action this measure would be expected to lead to increased fishing activity by common pool vessels that might target SNE/MA winter flounder, SNE/MA yellowtail flounder, and several other stocks. As a result it is reasonable to expect that common pool catches would increase form those in FY 2010 and 2011. This would increase fishing mortality for these stocks. Catches would not be allowed to exceed ACLs for these stocks, however, since other measures are in place to limit catches. Beginning in FY 2012 the common pool AMs will include trimester TACs for most species, allowing strict control of catches in-season. Other measures are also in place that would allow NMFS to keep catches below ACLs. As a result, while this measure might increase fishing mortality when compared to Option 1/No Action, mortality targets are not likely to be exceeded.

Impacts on other species

Option 2 removes the RGAs that affect groundfish fishing activity by common pool vessels in certain defined areas. The gears that are required typically have reduced catches of bottom-dwelling species and would be expected to reduce catches of monkfish, skates, and dogfish while fishing on groundfish trips. Conceptually the expected result would be increased fishing mortality for these species that would result from groundfish fishing activity. Common pool vessels represent only a small part of the fishery, however, so it is not likely these impacts would be noticeably different from the impacts of Option 1/No Action. This is particularly true given the information in section 6.5.5 that suggests that compliance is poor.

7.1.2.5 Accountability Measures

Option 1: No Action

Impacts on regulated groundfish

If this option is adopted the primary AM for ocean pout, both windowpane flounder stocks, Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder would be the trimester “hard” TAC system that applies to common pool vessels beginning in FY 2012. This measure may not be an effective control on fishing mortality for these stocks for several reasons. First, the AM applies only to common pool fishing vessels and does not constrain vessels fishing in sectors. As a result only part of the catches will be affected by the AMs. In FY 2010, common pool catches of these stocks as a percent of total groundfish catches ranged from a minimum of 1.2% for GOM/GB windowpane flounder to a maximum of 28.4% for SNE/MAB windowpane flounder (Table 57). This suggests that a perfectly implemented common pool AM could only account for an overage of the groundfish sub-ACL of a similar amount. In FY 2010 the commercial groundfish sub-ACL was only exceeded for GOM/GB windowpane flounder (see section 6.5.3.1 for a summary of FY 2010 catches) and the common pool clearly could not account for a similar overage in the future. A perfectly implemented common pool AM might be able to account for a groundfish sub-ACL overage of around 10 percent for the other stocks. With respect to total catches, the common pool percentage was smaller, only exceeding ten percent for Atlantic wolffish. It is unlikely an AM on the common pool alone could account for substantial overage of the total ACL.

Table 57 – Common pool and sector catches of six stocks. Data from NERO ACL monitoring reports for FY 2010.

	FY 2010 ACL Catch Estimates (mt)				
Stock	Total	Commercial Groundfish	Sector	Common Pool	Common Pool as % of Commercial Groundfish
SNE/MA Winter Flounder	363.2	47.4	42.3	5.1	10.8%
Northern Windowpane	162.1	153.5	151.7	1.8	1.2%
Southern Windowpane	534	73.6	52.7	20.9	28.4%
Ocean Pout	90.3	65.2	56.5	8.7	13.3%
Halibut	36	27.8	25.6	2.2	7.9%
Wolffish	22.5	22.4	18.9	3.5	15.6%

At issue, however, is the design of the AMs under Option 1/No Action for certain stocks. For ocean pout, Atlantic halibut, and the two windowpane flounder stocks the hard TAC AM that will be implemented in FY 2010 calls for adjusting trip limits if the sub-ACL is exceeded. The management plan already prohibits landing windowpane flounder and ocean pout so this restriction would not be effective in reducing fishing mortality for these stocks. There would be some reduction in mortality expected to result from reducing the Atlantic halibut trip limit form one fish to 0 if some of the fish survive that are discarded as a result of the measure. For SNE/MA winter flounder the Option 1/No Action alternative limits common pool fishing activity in the SNE/MA winter flounder stock area, which will reduce fishing mortality. If combined with a prohibition on landing by all vessels, this AM will effectively control fishing mortality for this stock. Indeed, in FY 2009 and 2010, possession of SNE/MA winter flounder was prohibited and fishing mortality was below F_{MSY} for the first time in recent years and was well-below the ACL – this suggests the Option 1/No Action AM might be effective. Similarly, with Atlantic wolffish, exceeding a trimester ACL results in a closure of statistical areas 513/514/521/522 to trawl, sink gillnet, and longline groundfish fishing activity. Whether this reduces mortality depends in part on timing. Few wolffish are caught in the winter months so if the AM is implemented at that time there would likely be little impact on fishing mortality. At other times of the year this measure would be very effective in reducing wolffish catches.

Overall, if this measure would be adopted, the controls on fishing mortality for ocean pout and windowpane flounder stocks would not be as effective as the other options. For Atlantic halibut, the controls would be similar to Option 3 but less effective than Option 2. Over the long-term this may lead to higher fishing mortality rates that might exceed mortality targets. The control for Atlantic wolffish would be better since fishing activity is actually reduced if the ACL is exceeded. For SNE/MA winter flounder, this measure would be effective because it restricts common pool fishing activity if the ACL is exceeded. This would reduce encounters with the stock – the other options reduce retention but there would be more fishing activity expected to continue and some dead discards would result.

Impacts on other species

This measure would not be expected to have any direct impacts on other species. This is primarily because the AMs only apply to common pool vessels which represent only a fraction of groundfish fishing activity. The AMs for ocean pout, windowpane flounders, and halibut would not be expected to have any real impacts on even that small amount of activity. The AMs for SNE/MA winter flounder and wolffish would, if triggered, reduce common pool fishing but given the limited nature of that activity it is not likely the impacts on the mortality of other species would be noticeable. When compared to Option 2 this measure would result in higher fishing mortality rates for other species but the difference may not be measureable.

Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish (Preferred Alternative for Windowpane Flounder and Ocean Pout Only)

Impacts on regulated groundfish

This AM would impose area-based restrictions if the total ACL for any of these stocks is exceeded. The restrictions are designed to apply at certain times and in certain areas. If an AM is triggered either selective gear is required in an area or the area is closed to fishing with particular gear. Details are provided in section 4.2.5. It is important to note that this AM affects all groundfish fishing activity, sector and common pool, unlike Option 1/No Action.

The technique used to identify the areas is described in detail in Appendix I but the following general overview will aid in understanding the biological impacts of the measure. Observer data and landings data were combined to determine where these stocks were being caught. For windowpane flounders and ocean pout most of the catch is discarded by trawls so landings data were not significant, but for Atlantic halibut and wolffish landings data were also examined. An estimate of catches (discards only for windowpane and ocean pout, landings and discards for other stocks) in each ten minute square was developed for each stock and for the appropriate gear types (generally just trawl gear for ocean pout and windowpane flounder; trawl, longline, and sink gillnet for wolffish and halibut). There are limitations to the data that are described in the appendix that create uncertainties in this approach. While observer data can be accurately binned to relatively small areas, VTRs are the only source of landings data and there are known to be errors in the accuracy of the information reported by fishermen (see Palmer and Wigley 2009). The results should not be viewed as being precise estimates because of these errors.

Once the catch data were binned by ten-minute square a test was applied to identify areas with statistically significant higher catches than the immediate area and the stock area as whole. These areas were used to select the AM areas where appropriate restrictions would be adopted. The size of the areas was selected based on the amount of catches that need to be affected. In addition, qualitative consideration was given to the data limitation previously described, the probability that effort may be displaced into other areas, and the likelihood that the measures may not be perfectly effective (see section 6.5.5 for a discussion of compliance with Amendment 16 restricted gear areas, which suggests that area-based gear restrictions are not always complied with).

In general, the proposed AM areas, if implemented, would be expected to reduce trawl catches of the targeted stocks by requiring selective gear. These gears have been shown to reduce catches of flatfish, the major target of these AMs, in several experiments. It is likely that there would be some effort displacement that would reduce the effectiveness of the measures: rather than use selective gear in the AM area, some fishermen may continue to use non-selective trawls and shift their effort into other areas to target the species they would lose when using the selective gear. For sink gillnet and longline gear the proposed measure would prohibit fishing in the defined AM areas. While this would make the AM more effective in these areas for these gears, it is more probable that effort would be displaced into other areas.

There are two sub-options for timing of this AM. If sub-option A is adopted an estimate of catches is made late in the fishing year and if the estimate exceeds the sub-ACL the AM is implemented at the start of the fishing year that immediately follows. The advantage of this option would be that if there is an overage measures are implemented very quickly to prevent additional overage. This would be expected to have a more immediate effect on fishing mortality and would make it more likely that mortality targets would be achieved. This is only true if the estimated catch is accurate. If the catch is under-estimated in-season then the AMs would not be triggered when necessary and the response to an overage would be delayed. Sub-option B attempts to address this concern by delaying the implementation of AMs until year 3 for an overage in year 1. This provides more time to receive and reconcile data and confirm catch estimates before restricting the fishery. The experience with monitoring FY 2010 catches supports this approach: catches for several stocks were initially over-estimated and needed to be revised.

As compared to Option 1/No Action and Options 3 and 4, this measure would be expected to lead to more control on groundfish fishery catches of ocean pout, Atlantic halibut, and windowpane flounders because fishing effort is constrained. Even if the selective gear is not perfectly effective the fact that both common pool and sector vessels are constrained by the AM makes it more likely that the measure will be sufficient to control catches to the ACLs. Because of the increased controls on catches it is more probably that this option will help to achieve mortality targets. It would be less effective for Atlantic wolffish than Option 1/No Action since fishing in the AM area is not prohibited for trawl gear and the AM area is smaller than the area that is closed in Option 1/No Action. It would be more effective for Atlantic wolffish than Option 4.

Impacts on other species

Option 2, if adopted, and if the AMs are triggered, may result in reduced fishing mortality for non-groundfish species that are caught on groundfish fishing trips. This is because the AMs either require use of selective trawl gear or close areas to sink gillnet and longline gear. The selective trawl gear would be expected to reduce catches of skates and monkfish in the AM areas. Similarly, closing areas to sink gillnet or longline gear would likely reduce catches of skates and dogfish. Mortality of these stocks under this measure would be expected to be lower than under any of the other options, including Option 1/No Action. These differences would only occur of the AMs are triggered because an ACL is exceeded.

Option 3: Atlantic Halibut No Possession AM (Preferred Alternative)

Impacts on regulated groundfish

If adopted this measure would prohibit landing Atlantic halibut if the sub-ACL would be exceeded. On the surface this measure appears similar to the Option 1/No Action alternative which allows for adjustments to the Atlantic halibut trip limit when a percentage of the TAC/ACL is projected to be caught. But unlike the No Action alternative, this measure would prohibit possession by both sector and common pool vessels. Since a greater percentage of the catch would be subject to this measure the control of fishing mortality would be more effective than under the No Action alternative. When compared to Option 2, this measure would likely be less effective. Unlike Option 2, which restricts fishing activity in certain areas if the ACL is exceeded, this measure does not restrict activity and similar amounts of halibut would be expected to be caught both before and after the AM is implemented. The effectiveness of this measure in reducing mortality would be due to the portion of the discarded catch that survives once the AM is implemented.

Impacts on other species

This measure would be unlikely to have any effect on fishing mortality for other species caught on groundfish fishing trips. This is because halibut is not a target species and even if the AM is triggered it is not likely to change groundfish fishing effort. If the AM is triggered, the impacts of this option on other species would be similar to Option 1/No Action and would have less effect on fishing mortality than Option 2. It cannot be compared to Options 4 or 5 because those measures are for different species.

Option 4: Atlantic Wolffish No Possession AM (Preferred Alternative)

Impacts on regulated groundfish

If adopted this measure would prohibit landing Atlantic wolffish. Unlike the Option 1No Action alternative, this measure would prohibit possession by both sector and common pool vessels at all times as a pro-active approach to an AM. When compared to Option 2, this measure would likely be less effective at controlling fishing mortality should the ACL be exceeded. Unlike either Option 1 or Option 2, which restricts fishing activity in certain areas if the ACL is exceeded, this measure does not restrict activity and similar amounts of wolffish would be expected to be caught both before and after the AM is implemented. The effectiveness of this measure in reducing mortality would be due to the portion of the discarded catch that survives.

Whether this AM would reduce fishing mortality on this stock would depend on what measures are in place before the ACL would be exceeded. This measure would not have any impacts on Atlantic wolffish fishing mortality unless commercial fishing vessels would be allowed to retain one fish as proposed in section 4.2.3.2. If possession is prohibited already this measure may be an effective tool to limit catches, but if there is an overage of the ACL there is no automatic response to implement additional measures.

It should be noted, however, that the M-S Act statutory language for AMs does not detail the nature of AMs. The requirement the statute establishes is that Councils must "…establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability." Annual catch limit (ACL) procedures are in place, adopted by Amendment 16. This measure is designed to ensure that catches remain below the ACL, which in turn is set lower than the overfishing level. As shown in section 6.5.3 (summary of 2010 catches), a prohibition on possession limited catches to about 30 percent of the ACL for this stock and less than 25 percent of the OFL. This suggests that prohibiting landing of this species is an effective, proactive AM for keeping catches below the overfishing level (as required by the statute) as well as the ACL. Adjustments to the FMP can be made by a framework action or amendment if, over time, it is determined that the AM is no longer effective and additional measures are need to ensure compliance with the statute.

When compared to either Option 1 or Option 2, this measure may have a slightly higher risk of allowing overfishing should catches increase in spite of the prohibition on possession. This is because under either of those options fishing activity is restricted if an overage occurs. If this option would be adopted, an additional action would be needed to improve the AM and or other management measures on order to control mortality.

Impacts on other species

This measure would be unlikely to have any effect on fishing mortality for other species caught on groundfish fishing trips. This is because wolffish is not a target species and even if the AM is triggered it is not likely to change fishing effort. If the AM is triggered, the impacts of this option on other species would be similar to Option 1/No Action and would have less effect on fishing mortality than Option 2. It cannot be compared to Options 3 or 5 because those measures are for different species.

Option 5: SNE/MA Winter Flounder No Possession AM (Preferred Alternative)

Impacts on regulated groundfish

If adopted this measure would treat a prohibition on prohibit landing SNE/MA winter flounder as a pro-active AM. Unlike the No Action alternative, this measure would consider this prohibition as both a management measure and an AM. When compared to Option 2, this measure would likely be less effective at controlling fishing mortality should the ACL be exceeded. Unlike either Option 1 or Option 2, which restrict fishing activity in certain areas if the ACL is exceeded, this measure does not restrict activity and similar amounts of SNE/MA winter flounder would be expected to be caught both before and after the AM is implemented. The effectiveness of this measure in reducing mortality would be due to the portion of the discarded catch that survives.

Whether this AM would reduce fishing mortality on this stock would depend on what measures are in place before the ACL would be exceeded and on whether it influences fishermen's behavior. If possession is prohibited already this measure may be an effective tool to limit catches, but if there is an overage of the ACL there is no automatic response to implement additional measures.

It should be noted, however, that the M-S Act statutory language for AMs does not detail the nature of AMs. The requirement the statute establishes is that Councils must "…establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability." Annual catch limit (ACL) procedures are in place, adopted by Amendment 16. This measure is designed to ensure that catches remain below the ACL, which in turn is set lower than the overfishing level. As shown in section 6.5.3 (summary of 2010 catches), a prohibition on possession limited catches to about 61 percent of the ACL for this stock and less than 24 percent of the OFL. This suggests that prohibiting landing of this species is an effective, proactive AM for keeping catches below the overfishing level (as required by the statute) as well as the ACL. Adjustments to the FMP can be made by a framework action or amendment if, over time, it is determined that the AM is no longer effective and additional measures are need to ensure compliance with the statute.

The effectiveness of this measure in preventing overfishing is further indicated by the stock assessment completed in 2011. As noted in section 6.2.1.2 (stock status), fishing mortality in 2010 was at the lowest level ever observed and was only one-quarter of the overfishing level. A concern is that this measure may increase bycatch. In 2010 discards were higher than the average since 2000, but declined to 97 mt from the ten-year high of 135 mt estimated in 2009. Discards will have to be monitored as stock size increases to make sure this measure does not result in bycatch that is not minimized to the extent practicable.

There are other AMs that would also limit catches. SNE/MA winter flounder is often caught with SNE/MA yellowtail flounder, so limits on the catches of this stock would also limit catches of SNE/MA winter flounder. Should this measure prove ineffective in controlling catches of this stock additional measures can be taken through the FMP's framework adjustment process.

When compared to either Option 1 or Option 2, this measure may have a slightly higher risk of allowing overfishing should – contrary to what occurred in 2009 and 2010 - catches increase in spite of the prohibition on possession. This is because under either of those options fishing activity is restricted if an overage occurs. If this option would be adopted, an additional action would be needed to improve the AM and or other management measures on order to control catches.

When compared to Options 1/No Action and Option 2, this measure may have a slightly higher risk of not preventing overfishing since there is no change in management should the ACL be exceeded. At present, there is a large buffer between the OFL level and the ACL so the increased risk is slight. If catches do approach the ACL, an amendment or framework action can be adopted to comply with M-S Act requirements for measures to ensure accountability. It cannot be compared to Options 2, 3 or 4 because those measures are for different species.

Impacts on other species

This measure would be unlikely to have any additional effects on fishing mortality for other species caught on groundfish fishing trips that differ from those described in section 7.1.2.1. Option 1/No Action. It cannot be compared to Options 2, 3 or 4 because those measures are for different species. When compared to Option 1, this AM would allow more fishing activity in the SNE area than would be the case if Option 1 was adopted and the AM was triggered. Because Option 1would only limit common pool fishing activity, and there is very little fishing by common pool vessels in this stock area, any differential impacts are likely to be minor.

7.2 Essential Fish Habitat Impacts

The Essential Fish Habitat impacts discussions below focus on changes in the amount or location of fishing that might occur as a result of implementing the various alternatives. This approach to evaluating adverse effects to EFH is based on two principles: (1) seabed habitat vulnerability to fishing effects varies spatially, due to variations in seabed substrates, energy regimes, living and non-living seabed structural features, etc., between areas and (2) the magnitude of habitat impacts is based on the amount of time that fishing gear spends in contact with the seabed. This seabed area swept (seabed contact time) is grossly related to the amount of time spent fishing, although it will of course vary depending on catch efficiency, gear type used, and other factors.

The area that is potentially affected by the proposed TACs has been identified to include EFH for species managed under the following Fishery Management Plans: NE Multispecies; Atlantic Sea Scallop; Monkfish; Atlantic Herring; Summer Flounder, Scup and Black Sea Bass; Squid, Atlantic Mackerel, and Butterfish; Spiny Dogfish; Tilefish; Deep-Sea Red Crab; Atlantic Surfclam and Ocean Quahog; Atlantic Bluefish; Northeast Skates; and Atlantic Highly Migratory Species. The Preferred Alternative action makes relatively minor adjustments in the context of the fishery as a whole, and, for the reasons stated above, is not expected to have any adverse impact on EFH. Furthermore, the Preferred Alternatives do not allow for access to the existing habitat closed areas on GB that were implemented in Amendment 13 to the Multispecies FMP and Amendment 10 to the Scallop FMP and therefore they continue to minimize the adverse impacts of bottom trawling and dredging on EFH. Overall, there are likely to be only minor differences between the EFH impacts of the preferred alternatives and those of the status quo.

7.2.1 Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits

7.2.1.1 Revised Status Determination Criteria for Winter Flounders and Gulf of Maine Cod

Option 1: No Action

Adoption of the No Action alternative would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be the criteria adopted in Amendment 16.

From a habitat perspective, the SDC themselves are less important than the catch limits that result from implementing those criteria to generate annual catch limits (ACL). Qualitatively, it is assumed that criteria that are not based on the most recent scientific advice may not result in increases in stock size over the long term, which hopefully should lead to increased catch per unit effort (CPUE), and therefore reduce seabed area swept. However, many factors interact to produce the seabed area swept in a particular fishery, such that the effect of not changing SDC on the amount of habitat impacts is uncertain at best. It is not clear that the impacts of this measure will differ from Option 2.

Option 2: Revised Status Determination Criteria (Preferred Alternative)

Adoption of Option 2 would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be based on the most recent benchmark assessments and would be based on the best available science, consistent with M-S Act requirements.

From a habitat perspective, the SDC themselves are less important than the catch limits that result from implementing those criteria to generate annual catch limits (ACL). Qualitatively, it is assumed that revised criteria based on the most recent scientific advice will result in increases in stock size over the long term, which hopefully should lead to increased catch per unit effort (CPUE), and therefore reduce seabed area swept. However, many factors interact to produce the seabed area swept in a particular fishery, such that the effect of changing SDC on the amount of habitat impacts is uncertain at best. It is not clear that the impacts of this measure will differ from Option 1.

7.2.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

Option 1: No Action

This option would maintain the rebuilding strategy adopted for this stock in FW 45, which calls for rebuilding by 2016 with a median probability of success. Assessment results from TRAC 2011 indicate that the stock cannot rebuild by 2016 even in the absence of all fishing mortality. Thus, if this strategy is continued, fishing mortality would have to be kept as close to 0 as possible. It is likely that catch limits associated with a near-zero fishing mortality rate would lead to decreases in fishing effort and thus decreases in seabed impacts, but the magnitude of such changes is difficult to predict. Compared to Option 2, this option might result in reduced fishing effort on GB, reducing area swept and reducing impacts to habitat in this area, but these results are uncertain at best.

Option 2: Revised Rebuilding Strategy for GB Yellowtail Flounder (Preferred Alternative)

These sub-options would modify the rebuilding strategy for GB yellowtail flounder, targeting a fishing mortality rate that will rebuild with a median probability of success by a specific date (2021 for sub-option A, and 2032 for sub-option B).

These extended rebuilding strategies and their associated higher fishing mortalities are likely to have associated increases in effort and seabed area swept as compared to No Action. However, although it is difficult to predict the magnitude of change, yellowtail flounder are caught in deeper, sandy portions of GB that are less vulnerable to fishing impacts. When compared to Option 1/No Action the impacts on EFH are uncertain but unlikely to be negative.

7.2.1.3 U.S./Canada Resource Sharing Understanding TACs

Option 1: No Action

The No Action option for this alternative results in no TACs being adopted for Eastern GB cod, Eastern GB haddock, and GB yellowtail. While this would likely reduce fishing and thus EFH impacts when compared to Option 2, it would also preclude any and all landings of fish from these stocks during 2012.

Option 2: U.S./Canada TACs ((Preferred Alternative))

Option 2 adopts the TMGC recommendations for the three stocks for 2012; in all cases the 2012 TACs are lower than the 2010 TACs, which would presumably reduce effort, bottom contact time, and EFH impacts as compared to limits currently in place. Note that this option likely has higher effort, bottom contact time, and EFH impacts in comparison with the No Action option, because No Action results in no TACs being set.

7.2.1.4 Administration of Scallop Fishery Sub-ACLs

Option 1: No Action

If this option is adopted there would be no changes in the way scallop fishery sub-ACLs are administered. Currently, AMs are implemented for the scallop fishery if that fishery exceeds its sub-ACL whether or not the overall ACL is exceeded. If the AMs are triggered, scallop fishing effort and thus EFH impacts will be redistributed spatially during the closure months. The possible increase or decrease in EFH impacts under seasonal AM closures is difficult to predict. Under this option, there is a greater likelihood that the AMs may be triggered than is the case with Option 2, but the possible increase or decrease in EFH impacts under seasonal AM closures is difficult to predict. This is because the changes in the distribution of fishing effort that might result from this measure cannot be predicted with accuracy.

Option 2: Changes to Scallop Fishery Sub-ACL Administration (Preferred Alternative)

If Option 2 is adopted, then scallop fishery catches of groundfish stocks would continue to be compared to the sub-ACLs, but the AM would only be triggered if the overall ACL was exceeded. Whatever the trigger, it is assumed that the area-closure AMs provide sufficient incentive to avoid catching sub-ACL stocks (GB yellowtail and SNE/MA yellowtail) in the scallop fishery. If these AMs are avoided, fishing effort, area swept, and EFH impacts are unlikely to change as a result of implementing this alternative. If the AMs are triggered, scallop fishing effort and thus EFH impacts will be redistributed spatially during the closure months. The possible increase or decrease in EFH impacts under seasonal AM closures is difficult to predict. This is because the changes in the distribution of fishing effort that might result from this measure cannot be predicted with accuracy.

7.2.1.5 Annual Catch Limit Specifications

Option 1: No Action

This option would maintain the specifications (OFLs/ABC/ACLs) for FY 2012 at the same levels adopted by FW 44 and FW 45. It would also maintain the distribution of the catches to various fisheries sub-components.

The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on essential fish habitat. The ACLs are consistent with the fishing mortality targets adopted by Amendment 16. These targets form the basis for the effort controls that apply to the common pool vessels and the amount of catch that can be taken by vessels that join sectors. The specification of ACLs, however, does have indirect impacts on essential fish habitat because they limit the total catches that can be harvested by fishermen and thus provide a constraint on fishing effort. The distribution of the ACLs can affect not only total groundfish fishing effort but also the distribution of that effort into the various groundfish stock areas. While in earlier years the ACLs did not have a direct impact on common pool vessels because those vessels are subject to effort controls, beginning in FY 2012 common pool vessels are subject to hard TACs for most stocks.

Implementation of Option 1/No Action would mean that specifications would not be changed from levels specified in FW 44 and FW 45. As a result fishing effort would be expected to be similar to that of the past two years and there would not likely be changes to impacts on EFH.

Overall, twelve of the ACLs in this option are identical to those in Option 2 (see Table 7 and Table 10). The ACL for GB winter flounder is slightly smaller, the ACL for GOM winter flounder is much smaller, the ACL for SNE/MA winter flounder is larger, and the GB yellowtail flounder ACL is larger, and the GOM cod ACL may be either larger or smaller. Generally these differences would not be expected to result in major shifts in fishing effort that might result in impacts on EFH that differ from Option 2. The exception to this general conclusion might be if the GO M cod ACL is significantly different in Option 2 than in Option 1/No Action. If the Option 1 ACL is larger, then when compared to Option 2 there may be more fishing effort in the GOM. Most GOM cod is caught by small vessels, so it is not likely that when compared to Option 2 there would be a shift of fishing activity by larger offshore vessels into the GOM. It is not likely any changes would result in differential impacts on EFH between the two options.

This option adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. In FY 2012 the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. There are no differences in the scallop fishery allocation between this option and Option 2, so there would not likely be any differential impacts to EFH between the options.

For the groundfish fishery, a larger ACL for GB yellowtail flounder would be adopted by this option than would be adopted by Option 2. For sector vessels, increased access to yellowtail flounder would be less likely to immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for EFH are likely to be minor. This provision only affects a small portion of the groundfish fleet, and yellowtail flounder fishing usually does not occur on complex, sensitive habitats.

Option 2: Revised Annual Catch Limit Specifications (Preferred Alternative)

Option 2 would adopt new ABCs for the following: GOM winter flounder, GB winter flounder, SNE/MA winter flounder, GB yellowtail flounder, GOM cod, GOM/GB windowpane flounder, SNE/MA windowpane flounder, and ocean pout. The ACL for GB winter flounder is slightly smaller, the ACL for GOM winter flounder is much smaller, the ACL for SNE/MA winter flounder is larger, and the GB yellowtail flounder ACL is larger, and the GOM cod ACL may be either larger or smaller. Changes in windowpane flounder and ocean pout ACLs are not likely to affect the distribution of fishing effort because these stocks cannot be retained and they are not targeted. Other specifications would remain as adopted by FW 44 and FW 45.

Generally the differences in ACLs between this option and Option 1/No Action would not be expected to result in major shifts in fishing effort that might result in impacts on EFH that differ from Option 1. The exception to this general conclusion might be if the GO M cod ACL is significantly different in Option 2 than in Option 1/No Action. If the Option 1 ACL is larger, then when compared to Option 2 there may be more fishing effort in the GOM. Most GOM cod is caught by small vessels, so it is not likely that a small ACL under Option 2 would lead to a shift of fishing activity by smaller vessels into the GB area. It is not likely any changes would result in differential impacts on EFH between the two options.

This option adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. In FY 2012 the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. There are no differences between the scallop fishery allocation between this option and Option 1 and so there would not likely be any differential impacts to EFH between the options.

For the groundfish fishery, a smaller ACL for GB yellowtail flounder would be adopted by this option than would be adopted by Option 1. For sector vessels, decreased access to yellowtail flounder would be more likely to immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for EFH are likely to be minor. This provision only affects a small portion of the groundfish fleet, and yellowtail flounder fishing usually does not occur on complex, sensitive habitats.

7.2.2 Commercial and Recreational Fishery Measures

7.2.2.1 Management Measures for SNE/MA Winter Flounder

Option 1: No Action (Preferred Alternative)

If adopted, the prohibition on landing SNE/MA winter flounder would continue. SARC 52 estimated very low fishing mortality during May-Dec 2009 and during 2010, and that catches were only 9% of the groundfish sub-ACL during fishing year 2010. If the prohibition continues, it is expected that there would be little fishing for SNE/MA winter flounder and associated species, such that habitat impacts would remain similar to those in recent years. When compared to Option 2, the habitat impacts in the SNE/MA area would be expected to be less. It should be noted that groundfish fishing in this area is a relatively small part of overall fishing effort and it is not clear that either option would have noticeable habitat effects.

Option 2: Allocate SNE/MA winter flounder to the fishery

If adopted, this option would allow the landing of SNE/MA winter flounder by both common pool and sector vessels within the groundfish fishery sub-ACL. This would probably lead to an increase in targeted fishing effort on the stock, and thus an increase in habitat impacts when compared to Option 1, but the magnitude of this increase would be limited as fishing effort would still be capped by the sub-ACL. It should be noted that groundfish fishing in this area is a relatively small part of overall fishing effort and it is not clear that either option would have noticeable habitat effects. Groundfish fishing in this area is a relatively small part of overall fishing effort, and effort would be capped by the sub-ACL. However, Option 2 may lead to an increase in fishing effort on the stock, which could increase bottom contact and lead to more habitat impacts than Option 1. The magnitude of this increase would be limited as fishing effort would still be capped by the sub-ACL.

7.2.2.2 Scallop Catch of Yellowtail Flounder in GB Access Areas – Modification of Restrictions

Option 1: No Action

If adopted, scallop fishery catches of yellowtail flounder in the CAI, CAII, and NLCA access areas would continue to be limited to 10 percent of the TAC (GB stock) or ACL (SNE/MA stock). This would not limit the potential total catches of yellowtail flounder by the scallop fishery beyond the limits set by the sub-ACL, but it would maintain the 10% limit for catches from within closed areas. When an access area is closed before all the allocated scallop trips have been taken the scallop fishery is awarded compensation trips in open areas. This limit might constrain fishing effort in the closed areas (the cap has been reached several times in the past) and result in a shift of effort into open areas. Generally, scallop catch rates in the access areas are higher than in the open areas, so shifting effort into the open areas when the cap is reached may increase seabed impacts when compared to Option 2.

Option 2: Eliminate cap on yellowtail flounder caught in the GB access areas (Preferred Alternative)

If adopted, this option would remove the 10% cap, but the scallop fishery would still be subject to the scallop fishery sub-ACL for each stock. This option would provide added flexibility for the scallop fishery to use its sub-ACL within either access areas or open areas within the GB and SNE/MA yellowtail stock areas. The likelihood of exceeding the sub-ACL will vary by year based on the size of the sub-ACL, the number of access trips allocated and the distribution of scallop access trips by area, so it is not possible to say whether this measure would affect the amount and location of scallop fishing effort in any particular year. However, it is generally accepted that scallop fishery EFH impacts will be reduced if fishing effort is concentrated in access areas, where scallop catch rates are higher and area swept is therefore lower for a given amount of catch. Therefore, to the extent that this option increases the likelihood that scallop fishing will occur in access areas because the 10% cap is removed, it is expected that impacts to EFH would be reduced as compared to Option 1/No Action.

7.2.2.3 Atlantic Wolffish Landing Limit

Option 1: No Action (Preferred Alternative)

If adopted, the zero possession limit for Atlantic wolffish would be maintained. This is not expected to have noticeable impacts on EFH when compared to Option 2. Wolffish is not a target species and fishing effort is not expected to be distributed differently whether Option 1 or Option 2 is adopted.

Option 2: Revised Atlantic Wolffish Possession Limit

If adopted, commercial vessels would be allowed to land one wolffish per trip. Wolffish is a very minor component of groundfish catches and an increase in the possession limit to one wolffish per trip is unlikely to have a large influence on fishing behavior, i.e., it is not expected that this measure would cause vessels to target wolffish. Thus, no changes in fishing location or the amount of fishing effort are expected, and no changes in EFH impacts would result from this measure. Impacts on EFH would not be any different than those expected under Option 1/No Action.

7.2.2.4 Common Pool Restricted Gear Areas

Option 1: No Action

If adopted, the Western GB Multispecies RGA and the Southern New England Multispecies RGA would be maintained. These areas adopt gear restrictions only for common pool groundfish fishing vessels. These vessels represent only a small portion of total groundfish fishing activity and so this measure is not likely to result in a measureable shift in fishing effort when compared to Option 2. It is not likely that there would be anything more than a minimal reduction in EFH impacts when compared to that option.

Option 2: Removal of Common Pool Restricted Gear Areas (Preferred Alternative)

If adopted, the Western GB Multispecies RGA and the Southern New England Multispecies RGA would be removed. This change would be expected to lead to increased fishing activity by common pool vessels that might target flatfish species, including SNE/MA winter flounder, SNE/MA yellowtail flounder, etc. However, as catches of these species would still be limited by their ACLs, any increases in EFH impacts would likely be minimal when compared to Option 1/No Action.

7.2.2.5 Accountability Measures

Option 1: No Action

If adopted, AMs for Atlantic halibut, ocean pout, windowpane flounder, and Atlantic wolffish will remain as specified by Amendment 16. For wolffish and SNE/MA winter flounder, exceeding the ACL results in an area closure for common pool vessels; for the other species possession limits are decreased. Because these measures only apply to common pool vessels this measure would have less potential effect on the distribution of fishing effort than Options 2 or 5; Options 3 and 4 are not likely to have any effect on fishing effort and the EFH impacts would be similar to this option.

Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish (Preferred Alternative for Windowpane Flounder and Ocean Pout Only)

Windowpane flounder and ocean pout:

If adopted, this option would implement trawl gear restrictions in certain areas during either year 2 or year 3 based on ACL overages that occurred in year 1. Windowpane and ocean pout currently have zero possession limits and are therefore not target species. Implementing more restrictive area-based AMs might encourage increased avoidance of these species, but only negligible shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts are expected when compared to Option 1. This option cannot be compared to Options 3, 4 or 5 because they address different species.

Atlantic halibut:

If adopted, this option would (1) require the use of selective trawl gear in specified trawl halibut AM areas, (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear halibut AM areas, and (2) set a zero possession limit for all vessels. Because halibut is not a target species, shifting from a lower possession limit to a zero possession limit/gear-area restriction AM is only expected to cause negligible shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts when compared to Options 1 and 3. This option cannot be compared to Options 4 or 5 because they address different species.

Atlantic wolffish:

If adopted, this option would (1) require the use of selective trawl gear in specified trawl wolffish AM areas, and (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear wolffish AM areas. The measures would not be in effect during January, February, or March because wolffish next guarding behavior makes them generally unavailable to the fishery at that time. Because wolffish are such a small component of groundfish catches, shifting from a common-pool area closure to a gear/area restriction AM is not expected to cause large shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts when compared to Option 1 or 4. This option cannot be compared to Options 3 or 5 because they address different species.

Option 3: Atlantic Halibut No Possession AM (Preferred Alternative)

This option would implement a zero possession limit for all vessels if the wolffish ACL is exceeded. Because wolffish are such a small component of groundfish catches, shifting from a common-pool area closure to a seasonal possession limit AM is only expected to cause negligible shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts when compared to Option 1/No Action and Option 2. This option cannot be compared to Options 4 and 5 because they address different species.

Option 4: Atlantic Wolffish No Possession AM (Preferred Alternative)

This option would implement a zero possession limit for all vessels if the wolffish ACL is exceeded. Because wolffish are such a small component of groundfish catches, shifting from a common-pool area closure to a seasonal possession limit AM is not expected to cause large shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts when compared to Options 1 and 2. This option cannot be compared to Options 3 and 5 because they address different species.

Option 5: SNE/MA Winter Flounder No Possession AM (Preferred Alternative)

This option would define the possession prohibition for this stock as an AM. This would not be expected to result in major changes in the distribution of fishing effort when compared to Option 1; any habitat impacts are described in section 7.2.2.1/Option 2 (SNE/MA winter flounder possession limit). This option cannot be compared to options 2, 3 or 4 because they address different species.

7.2.3 Summary of Essential Fish Habitat Impacts of the Preferred Alternatives

Overall, the impacts in EFH of the Preferred Alternatives are expected to be negligible relative to the other alternatives. The following table summarizes the expected impacts.

Table 86 – Expected EFH Impacts of the Preferred Alternatives relative to the other alternatives

Proposed Measure	Expected Relative Habitat Impacts	Rationale
Revised SDC	0	Primarily administrative, unclear any different impacts when compared to No Action
Revised GB yellowtail flounder rebuilding strategy	0	Effects uncertain, not likely to be negative because of where this stock is caught (deeper, sandy portion of GB that are less vulnerable to fishing)
Specification of US/Canada area TACs	0	Compared to No Action, possible minor shifts in location of groundfish fishing effort as a result of measures designed to keep catches below these TACs, but no adverse effects expected
Administration of scallop fishery sub-ACLs	0	Difficult to predict impacts ,unlikely to be negative because scallop effort less likely to be redistributed than under No Action
Specification of ACLs	0	Primarily administrative with no direct impacts on EFH; may lead to very minor positive impacts compared to No Action because catches will be less than those under No Action
SNE/MA Winter Flounder management measures – prohibit possession	0/+	No Action alternative preferred; may marginally reduce fishing effort in SNE but any differences compared to Option 2 are marginal
Access Area Catch of Yellowtail Flounder – Remove Cap	+	Since more scallop effort likely to take place in access areas, that generally have higher CPUEs, impacts to EFH likely to be reduced
Atlantic Wolffish Landing Limit Retained	0	No impacts to EH expected when compared to Option 2 because measure is not likely to change fishing effort
Common Pool Restricted Gears Areas Removed	0	Minimal impacts because change only affects common pool vessels that represent a small part of groundfish fishing activity
Revised Accountability Measures	0	Negligible changes in impacts to EFH expected from all the Preferred Alternatives because measures are unlikely to result in changes in the magnitude or distribution of fishing effort

7.3 Impacts on Endangered and Other Protected Species

7.3.1 Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits

7.3.1.1 Revised Status Determination Criteria for Winter Flounder and GOM cod

Option 1: No Action

This option would keep existing SDCs for the three winter flounder stocks and GOM cod. There would be no changes to expected catch levels over the long-term. The impacts of the fishery to protected species may not change as a result of the continuation of the rebuilding plan, however this option would be inconsistent with the requirements of the M-S Act, specifically National Standard 2 as discussed in detail in Section 7.1.1.1. Due to the unknown impacts of Option 2, it is not clear if that option would have more of an effect than this No Action option.

Option 2: Revised Status Determination Criteria for Georges Bank, Gulf of Maine, and Southern New England Winter Flounder and Gulf of Maine Cod (Preferred Alternative)

This option would adopt new SDCs for these stocks based on recent (or soon to be completed) assessment results. These new criteria determine the amount of catch that is available in both the short and long-term. The new SDCs result in a small increase in the GB winter flounder MSY and about a 20 percent increase in the SNE/MA winter flounder MSY. The increase for GOM cod is not yet known and the MSY value for GOM winter flounder is unknown. Over the long-term this measure could result in increased groundfish fishing activity in the SNE/MA winter flounder stock area but this will not occur until the stock is rebuilt. This could therefore increase interactions between the groundfish fishery and endangered and protected species in this area as a result, but the specific impact to protected resources overall will remain unknown until the stocks are rebuilt and fishing levels can be known. Compared to the No Action option, it is therefore unclear if this option will have more of an impact over the long term.

7.3.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

Option 1: No Action

This option would rebuild this stock more quickly than the other options under consideration by targeting rebuilding by 2016 with a 50 percent probability of success. The 2011 assessment of this stock (TRAC 2011) indicated that a fishing mortality of F=0 would need to be adopted to achieve this goal (although the assessment noted that goal could not be achieved even under this fishing mortality). A fishing mortality of F=0 would mean all fishing would cease, and would likely result in a benefit for protected species by reducing any potential interaction with groundfish fishing gear in all areas at all times. With no fishing in the area, however, monitoring of those areas and protected resources would decrease. This option is likely to have less of an impact on protected resources, compared to Option 2.

Option 2: Revised Rebuilding Strategy for Georges Bank Yellowtail Flounder (Preferred Alternative)

This option considers two different rebuilding periods: sub-option A would rebuild by 2023 and sub-Option B would rebuild by 2032. Either option would allow for greater catches during rebuilding than would be the case under Option 1/No Action.

Compared to the Option 1/No Action alternative, these sub-options would possibly result in more effort exerted by the fishery; and may therefore result in more possible gear interactions for protected species, such as harbor, hooded and harp seals. Although not directly correlated, the greater the fishing effort, the more interactions with protected species may occur. Sub-option A has less probability of gear interaction with protected species than sub-option B as it has the lowest target fishing mortality rate. Effort in the fishery may or may not result in area shifts; it is unclear how fishermen may react to the target mortality rates. Overall it is important to note that the differences in impact on protected species between the sub-options are likely to be minor, and the target fishing mortality values may change in future years if stock conditions differ from the projection results. In all cases the impact to protected species is likely to be negative but inconsequential. The uncertainty in the location and amount of effort exerted by the fishery, however, makes it difficult to calculate the amount of impact that the four sub-options may have on protected species, from impacts such as forage availability to encounters with fishing vessels.

7.3.1.3 U.S./Canada Resource Sharing Understanding TACs

Option 1: No Action

Under this option no TACs would be implemented for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder in the U.S./Canada Management Area for FY 2012. The impact to protected species may be positive, as there would be less effort in the area, which would reduce the likelihood of fishery encounter with protected species. No Action would also shorten the rebuilding time of the stock, which could increase the amount of forage available for protected species. Overall, the impacts are expected to be negligible. Overall, the impacts are expected to be negligible and similar to Option 2.

Option 2: U.S./Canada TACs (Preferred Alternative)

This option would adopt the TMGC recommendations for GB cod, GB haddock, and GB yellowtail in the U.S./Canada area for FY 2012. The FY 2012 TACs would be lower than the FY 2011 TACs and would maintain the rebuilding schedule for the pertinent stocks, which may increase potential forage and reduce the probability of fishery encounters with protected species. The FY 2012 TACs under this option would be higher than the No Action alternative, which would not specify any TACs for the three stocks. Therefore, the impacts to protected species under this alternative may increase slightly compared to the No Action alternative. However, the rebuilding schedule for the pertinent stocks would be faster, and forage species may be more readily available. Changes in the distribution of fishing effort in the U.S./Canada Management Area as a result of this action are unknown, though the impacts are expected to be negligible as a result of this action.

The effect of a zero allocation of trips in the CAII SAP is difficult to evaluate because fishing effort would still be allowed in CAII under the expanded access allowed for haddock from August 1 through January 31. There would likely be an increase in fishing effort in the Eastern U.S./Canada Management Area in FY 2012 compared to years prior to FY 2010 due to the opportunity to fish in CAII.

Compared to fishing years prior to FY 2010, there is likely to be an increase in fishing effort in the Eastern U.S./Canada Area due to the opportunity to fish in CAII, which had not been accessible to the groundfish fishery since 2004. An increase in effort would have limited effect on ESA-listed cetaceans given the measures that are already in place under the ALWTRP for the use of gear in the groundfish fishery, and would have limited effect on ESA-listed sea turtles given their distribution and abundance on Georges Bank.

Delay of the use of trawl gear in the U.S./Canada Management Area until August 1, 2012 would benefit protected species, such as small cetaceans, that occur in the management area and can be captured in trawl gear. A delay in the use of trawl gear would not change the effects on large cetaceans since these species are not captured in trawl gear. The delay would also not likely change the effects on sea turtles because of the relatively low abundance and distribution of sea turtles in the U.S./Canada Management Area. Overall the impact of this option is likely to be similar to the No Action option.

7.3.1.4 Administration of Scallop Fishery Sub-ACLs

Option 1: No Action

If Option 1/No Action is adopted there would not be any changes to the administration of scallop fishery sub-ACLs of groundfish stocks. The impacts on endangered and other protected species depends in large measure on which stocks have scallop fishery sub-ACLs. At present there are only two: GB yellowtail flounder and SNE/MA yellowtail flounder. The sub-ACLs have the potential to impact the distribution of scallop fishing effort because if exceeded scallop fishing activity is limited the following year.

When compared to Option 2 there is the possibility that the AMs will be triggered more frequently if this option is adopted. This is because the only criterion that must be met is for the scallop sub-ACL to be exceeded. The impacts on protected species depend on which AM is triggered. If only the GB yellowtail flounder AM is triggered it is possible the scallop fishing effort may shift into the SNE area where interactions with turtles are more common. If only the SNE yellowtail flounder AM is triggered effort may shift out if the SNE area. The major concern would be if effort shifts in ways that were not expected when scallop fishing measures were adopted. If that were to occur then the impacts on protected and endangered species may be different than that analyzed in the scallop action implementing the measures. These impacts could be either positive or negative.

With respect to Option 3, if Option 1/No Action is adopted any uncaught part of the GB yellowtail flounder sub-ACL for the scallop fishery would remain uncaught. As a result groundfish fishing effort on GB might be marginally smaller than if Option 3 is adopted. This may provide minor benefits to protected and endangered species but the difference in groundfish fishing effort are likely to be small and any benefits may be undetectable.

Option 2: Changes to Scallop Fishery Sub-ACL Administration (Preferred Alternative)

If Option 2 is adopted the scallop AMs would only be implemented if one of two criteria were met: either the overall ACL is exceeded or the scallop fishery exceeds its sub-ACL by 50 percent or more. These changes make it less likely that the AMs will be implemented. As a result, when compared to Option 1/No Action, there are less likely to be unexpected shifts in the distribution of scallop fishing effort that could lead to unforeseen impacts on protected and endangered species. As a result this option would be expected to be beneficial to these species.

This option is not directly comparable to Option 3. The impacts compared to Option 1 are difficult to determine given the uncertainty in how effort may shift as a result.

Option 3: Re-Estimation of Scallop Fishery GB Yellowtail Flounder Sub-ACL (Preferred Alternative)

If this option is adopted then it is less likely that there will be uncaught GB yellowtail flounder. This is because if the scallop fishery does not catch all of its sub-ACL, the amount is re-estimated and any difference is made available to the groundfish fishery. Generally the groundfish fishery catches nearly all of the GB yellowtail flounder that is available. As a result, there may be slightly more fishing effort on GB than would be the case if Option 1 is adopted. Although not directly correlated, the greater the fishing effort, the more interactions with protected species may occur. However, any changes are likely to be minor and are not likely to jeopardize endangered or other protected species. The scallop fishery sub-ACL for GB yellowtail flounder is typically a few hundred metric tons and if only part of this is made available to the groundfish fishery it would not lead to major changes in fishing effort.

This option is not directly comparable to Option 2. Option 1 may have slightly smaller impact on protected resources, given that groundfish fishing effort on GB might be marginally smaller than if Option 3 is adopted.

7.3.1.5 Annual Catch Limit Specifications

Option 1: No Action

This No Action option does not modify the OFLs/ABCs/ACLs for GB cod, GB haddock, GB yellowtail flounder, white hake, and pollock that were adopted by FW 44 (NEFMC 2010) and FW 45 (NEFMC 2011). All of the elements of the ACLs would remain the same, such as the allocations of GB and SNE/MA yellowtail flounder to the scallop fishery that were adopted in that same action.

No major protected species impacts would be expected to occur as a result of the No Action option. As such, the provision should not result in impacts beyond those analyzed and discussed in FW 44 (NEFMC 2010) and FW 45 (NEFMC 2011). As summarized from those actions the specification of ACLs was not expected to have direct impacts on protected species, and was consistent with the fishing mortality targets adopted by Amendment 16. Due to the unknown nature of the ACLs that will be set, it is unknown if this option will have less or more of an impact than Option 2.

Option 2: Revised Annual Catch Limit Specifications (Preferred Alternative)

This option proposes to adopt new specifications and ACLs for FY 2012 for twelve stocks and for FY 2012- 2014 for the remainder. This measure includes the identification of ACLs, OFLs, and ABCs as required by the M-S Act and as implemented by Amendment 16. It also incorporates adoption of the incidental catch TACs for the special management programs that use Category B DAS.

As was mentioned in the analysis of the previous options, the greater the fishing effort, the more possibility that interactions with protected species may occur. The ACLs for twelve stocks do not differ from that for the Option 1/No Action alternative. The ACLs for GB and GOM winter flounder and SNE/MAB windowpane flounder are larger, while the ACLs for ocean pout, GOM/GB windowpane flounder, and SNE/MA winter flounder are smaller. Because the majority of the ACLs are not different than those in Option 1/No Action, the impacts of the ACLs to protected species under this option are not expected to differ from that described under the No Action alternative.

One ACL that may have an impact on endangered and protected species is the ACL for GOM cod. If the ACL for this stock is drastically smaller than that in Option 1/No Action there could be beneficial impacts on endangered or protected species in the GOM. GOM cod is a key target species for sink gillnet vessels that have interactions with harbor porpoise and seals. A drastically reduced ACL for GOM cod would be expected to reduce sink gillnet activity and result in fewer interactions between this gear and these species. Conversely if the ACL is much larger than that in Option 1/No Action, it would be expected to result in more interactions.

It is important to note that all of the options which could cause increases or decrease in interactions with the fishery the overall impact to protected species are likely to be negligible, and the impacts are uncertain as quantitative analysis has not been performed. The quantitative consequences of these changes are unknown, but could be positive if effort is reduced in seasonal high use areas and the reduction overlaps with the distribution of protected resources. Catches in the fishery will still be constrained by other limitations placed on the fishery, such as those relating to the catch of other co-managed species and bycatch, thereby mitigating the impacts of the potential changes.

7.3.2 Commercial and Recreational Fishery Measures

7.3.2.1 Management Measures for SNE/MA Winter Flounder

Option 1: No Action (Preferred Alternative)

If this option is adopted landing SNE/MA winter flounder would continue to be prohibited. When compared to Option 2 this may lead to reduced groundfish fishing effort in the SNE/MA winter flounder stock area as vessels may move to other areas or fisheries on order to avoid this stock. Whether this will benefit or harm endangered and other protected species is difficult to predict because it depends on the exact nature of the effort shifts that occur. The changes in effort are also unlikely to be large and any impacts would be expected to be negligible.

Option 2: Allocate SNE/MA Winter Flounder to the Groundfish Fishery

If Option 2 is adopted commercial groundfish fishing vessels would be allowed to land SNE/MA winter flounder. When compared to Option 1 this may result in an increase in groundfish fishing effort in the stock area. Most of an effort increase would likely be with trawl gear. Increases in effort would be expected to lead to the possibility of increased interactions. The ACLs for this stock, however, are very low and any increases in effort resulting from this measure would be slight. It is not likely that if adopted this measure would have detectable impacts on endangered or other protected species. The impacts of this measure may be to increase interactions when compared to Option 1 but the differences would likely be so slight as to be undetectable.

7.3.2.2 Scallop Catch of Yellowtail Flounder in Access Areas – Modification of Restrictions

Option 1: No Action

This option would not modify the administration of AMs for scallop fishery catches of yellowtail flounder in the CAI, CAII, and NLCA access areas. As a result it is more likely that the access area cap might be exceeded and AMs triggered. The AM immediately shifts effort out of the access areas. These shifts in effort may affect the interaction of the scallop fishery with endangered and other protected species. While the exact nature of these shifts is difficult to predict any shifts of effort out of the CA or CAII access areas into SNE might increase interactions with turtles. Such changes are more likely under this option than under Option 2.

Option 2: Eliminate Cap on Yellowtail Flounder Caught in the GB Access Areas (Preferred Alternative)

This option would remove the cap on yellowtail flounder that can be caught in access areas. When compared to Option 1this removes the possibility that scallop fishing in the access areas might be stopped due to excessive yellowtail flounder catches, leading to a redirection of effort into other areas. This makes it easier for scallop management actions to predict the distribution of scallop fishing activity and means that realized impacts on endangered and protected species will be consistent with those analyzed in the scallop action. When compared to Option 1, endangered and protected species will benefit from the ability to more accurately consider the effects of scallop fishing activity on these species.

7.3.2.3 Atlantic Wolffish Landing Limit

Option 1: No Action (Preferred Alternative)

Possession of Atlantic wolffish would continue to be prohibited if this option is adopted. Atlantic wolffish is identified by NOAA a species of concern: a species for which NOAA has concerns regarding status but there is not information that indicates a need to list the species under the Endangered Species Act. A petition for listing wolffish under the ESA was reviewed and in November, 2009 NMFS made the decision that a listing as threatened or endangered was not warranted. When compared to Option 2, this measure would be expected to benefit wolffish (a species of concern) because some fish that are caught and discarded would be expected to survive, particularly if discarded from trawl gear. It would not be expected to have any impacts on endangered or other protected species; wolffish is not a target species so this measure would not affect fishing effort, and as a result there would not be expected to be any difference in groundfish fishing effort between this option and Option 2.

Option 2: Revised Atlantic Wolffish Possession Limit

Commercial vessels would be allowed to land one wolffish per trip if this option is adopted. Atlantic wolffish is identified by NOAA a species of concern: a species for which NOAA has concerns regarding status but there is not information that indicates a need to list the species under the Endangered Species Act. A petition for listing wolffish under the ESA was reviewed and in November, 2009 NMFS made the decision that a listing as threatened or endangered was not warranted. When compared to Option 1, this measure would be expected to increase fishing mortality for wolffish (a species of concern) because fish that are retained would die whereas those fish would be discarded under Option 1 and some of those discard fish would survive. It would not be expected to have any impacts on endangered or other protected species; wolffish is not a target species so, this measure would not affect fishing effort, and as a result there would not be expected to be any difference in groundfish fishing effort between this option and Option 1/No Action.

7.3.2.4 Common Pool Restricted Gear Areas

Option 1: No Action

If this option is adopted then the RGA measures adopted in Amendment 16 would remain in effect. These measures require the use of selective gear in an area of western GB and an area of SNE. The measure only applies to common pool vessels fishing on groundfish trips and may deter some of those vessels from fishing in the RGAs. Because common pool vessels represent only a small part of groundfish fishing activity there this measure does not significantly affect groundfish fishing effort. While fishing effort and interactions with endangered and protected species are not directly correlated, the limited impacts of this measure on overall groundfish fishing activity make it unlikely that it will have any impacts on endangered or other protected species. There are not likely any differences between this option and Option 2.

Option 2: Removal of Common Pool restricted Gear Areas (Preferred Alternative)

If this option is adopted then the RGA measures adopted in Amendment 16 would be eliminated. As a result some common pool vessels may increase their groundfish fishing activity in the existing RGAs. Because common pool vessels represent only a small part of groundfish fishing activity there this measure does not significantly affect groundfish fishing effort. While fishing effort and interactions with endangered and protected species are not directly correlated, the limited impacts of this measure on overall groundfish fishing activity make it unlikely that it will have any impacts on endangered or other protected species. There are not likely any differences between this option and Option 1/No Action.

7.3.2.5 Accountability Measures

Option 1: No Action

If this option is adopted, whether there would be any impacts on endangered or other protected species depends on whether the AM is implemented or whether fishing behavior is changed in anticipation of the AM.

The AMs for ocean pout, windowpane flounder, wolffish, and halibut under this option allow adjustments to trip limits but possession is already prohibited for three of these species and only one halibut per trip can be landed. This AM would not be expected to affect fishing activity in any way and would not be expected to have direct impacts on endangered and other protected species. When compared to Option 2 this measure would not result in any changes in fishing effort and would not be expected to have any differential impacts on endangered and other protected species. The effects would likely be similar to Options 3 and 4, which also use a prohibition on possession for halibut and wolffish AMs.

The AMs for wolffish and windowpane flounder, if triggered, result in closures of certain areas to common pool fishing activity. Particularly in the GOM this could benefit harbor porpoise and various seals since the areas they are found in the areas that would be closed. Common pool fishing activity is a small fraction of overall groundfish fishing activity so it is not clear that these impacts will be measurable. When compared to Option 2 the benefits would be expected to be less since under Option 2 more vessels would be affected and more effort would be displaced from the AM areas in those options (which are smaller than the areas in this option). When compared to Option 5, in which the changes are likely going to be small, the difference between this option is likely not measureable.

Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish (Preferred Alternative for Windowpane Flounder and Ocean Pout Only)

This option would constrain fishing activity in defined areas if ACLs for these stocks are exceeded. Vessels using trawl gear are required to use selective gear and fixed gear (sink gillnet and longlines) are prohibited in the areas.

The AMs in this option, if triggered may result in shifts in distribution of fishing activity. Because they affect both common pool and sector vessels the effort shifts would be expected to be larger than those that may occur under Option 1. The most likely shifts will be for gillnets and longline vessels because the AMs actually close areas if the wolffish or halibut AMs are triggered. The specific areas are relatively small, however, and it is not likely that any impacts on endangered or other protected species are likely to be measurable. With respect to the trawl gear AMs the areas are larger but some activity is still allowed within the areas. Again it is not likely that effort shifts will result in measurable impacts – either positive or negative – on endangered or other protected species. When compared to Option 1/No Action this Option would not be expected to have nay differential impacts on these species. When compared to Option 3 and 4 there may be manor differences since neither of those options would be expected to result in any changes in fishing effort, but the magnitude will be slight and the direction cannot be determined. This measure cannot be compared to Options 5 because it addresses a different stock.

Option 3: Atlantic Halibut No Possession AM (Preferred Alternative)

If this option is adopted, whether there would be any impacts on endangered or other protected species depends on whether the AM is implemented or whether fishing behavior is changed in anticipation of the AM.

Until this AM is triggered, only one halibut per trip can be landed and as a result halibut is not a target species and does not determine fishing activity. The AM for halibut under this option prohibits landing this species of the ACL is exceeded. This AM would not be expected to affect fishing activity in any way and would not be expected to have direct impacts on endangered and other protected species. When compared to Options 1 or 2 this measure would not result in any changes in fishing effort and would not be expected to have any differential impacts on endangered and other protected species. The uncertainty of impacts in Option 4 make it difficult to determine the difference between the two options, and this measure cannot be compared to Options 5 because it addresses a different stock.

Option 4: Atlantic Wolffish No Possession AM (Preferred Alternative)

If this option is adopted, whether there would be any impacts on endangered or other protected species depends on whether the AM is implemented or whether fishing behavior is changed in anticipation of the AM. Wolffish cannot be landed even if this AM is triggered. As a result, this AM would not be expected to affect fishing activity in any way and would not be expected to have direct impacts on endangered and other protected species. When compared to Options 1 or 2 this measure would not result in any changes in fishing effort and would not be expected to have any differential impacts on endangered and other protected species. The uncertainty of impacts in Option 3 make it difficult to determine the difference between the two options, and this measure cannot be compared to Options 5 because it addresses a different stock.

Option 5: SNE/MA Winter Flounder No Possession AM

This option would define the possession prohibition for this stock as an AM. This would not be expected to result in major changes in the distribution of fishing effort; any protected species impacts are described in section 7.2.2.1/Option 2. This differs from Option 1/No Action, which might result in small changes in fishing behavior if the AM is triggered. As noted, these changes are likely small and so the difference between this option and Option 1/No Action is likely not measurable. This measure cannot be compared to Options 2, 3, or 4 because it addresses a different stock.

7.4 Economic Impacts

7.4.1 Updates to Status Determination Criteria, Formal Rebuilding Programs, and Annual Catch Limits

7.4.1.1 Revised Status Determination Criteria for Winter Flounder and GOM cod

Option 1: No Action

In the near-term, economic impacts of status determination criteria (SDC) are transmitted through the effect these changes have on setting OFLs, ABCs, and ultimately on ACLs. For an analysis of the economic impact of ACLs associated with this option see section 7.4.1.5.

Over the long term, the specification of SDCs provides a limit on the potential harvest from the fishery. The Option 1/No Action values of MSY are lower than Option 2 for GB winter flounder (200 mt) and SNE/MA winter flounder (1,986 mt). Based on the average price of $2.00 per pound for winter flounder in FY 2010 this option would result in potential revenues that are about $9.6 million less than if Option 2 is adopted. Similar calculations cannot yet be performed for GOM cod until the assessment is completed, and an MSY value has not been estimated for GOM cod.

Option 2: Revised Status Determination Criteria for Georges Bank, Gulf of Maine, and Southern New England. Mid –Atlantic Winter Flounder Stocks and GOM cod (Preferred Alternative)

Economic impacts of status determination criteria are transmitted through the affect these changes have on setting OFLs, ABCs, and ultimately on ACLs. For an analysis of the economic impact of ACLs associated with this option, see section 7.4.1.5.

Over the long term, the specification of SDCs provides a limit on the potential harvest from the fishery. The Option values of MSY are higher than Option 1/No Action for GB winter flounder (200 mt) and SNE/MA winter flounder (1,986 mt). Based on the average price of $2.00 per pound for winter flounder in FY 2010 this option would result in potential revenues that are about $9.6 million more than if Option 2 is adopted. Similar calculations cannot yet be performed for GOM cod until the assessment is completed, and an MSY value has not been estimated for GOM cod. Whether this additional revenue is realized would depend on rebuilding progress for these stocks.

7.4.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

Option 1: No Action

This option would maintain a rebuilding strategy that targets rebuilding the stock by 2016 with a median probability of success. A recent assessment shows that this is not possible even in the absence of all fishing mortality. If this option is adopted the management goal would likely be to reduce fishing mortality to as close to zero as possible. The present value of the revenues streams from this stock for the No Action rebuilding strategy are shown in Table 59. These revenues are based on the value of GB yellowtail flounder and do not consider impacts on other species. If the TAC is as close to zero as possible this would constrain scallop fishing on GB since that fishery is subject to a GB yellowtail flounder sub-ACL. In addition, sector vessels may not be able to fish in the GB yellowtail flounder stock area if they do not have enough ACE of this stock to account for discards. Because of these factors, Option 1/No Action, if adopted, would result in large reductions in revenues from the groundfish fishery and the scallop fishery that are only partially captured by Table 59.

Option 2: Revised Rebuilding Strategy for GB Yellowtail Flounder (Preferred Alternative)

Impacts on regulated groundfish

The economic impacts of the different rebuilding strategies were estimated by calculating the net present value of the stream of potential revenues for each rebuilding strategy.

Comparison of alternative benefit streams over time requires discounting future benefits to convert all benefit streams to a present value. For this purpose, a discount rate of 3% was selected as recommended by NOAA to reflect the social rate of time preference (NOAA 1999). Net present values are calculated through 2032, the approximate terminal rebuilding date for the longest-recovery duration option. The economic analysis included an option of fishing at F_{MSY}, which is not a measure that is included as a possible action because it does not achieve SSB_{MSY}.

The NPV analysis translates the potential landing streams into future revenues, discounted as appropriate, by applying an average price to the potential Georges Bank yellowtail flounder landings. To calculate this average price, a Monte Carlo approach was used. Because fish prices are elastic--that is, price varies with quantity--a range of potential prices was generated using the average monthly yellowtail flounder prices from 1996-2010 based on NMFS dealer data (Figure 34). From this range of prices one value is randomly drawn for each iteration of a given quantity and year, with the following decision rule: if the quantity is above 4K mt, the price is randomly drawn from the bottom half of the observed price distribution; if the catch is below 4K mt the price is drawn from the top half of the distribution. Results are based on 500 random draws and the mean value and 5% and 95% confidence intervals are reported.

Of the analyzed rebuilding approaches, the F_{MSY} strategy provides the highest landed net present value based on this analysis. However, this strategy fails to achieve the biomass rebuilding target. Of the approaches analyzed that achieve the biomass rebuilding target, both the F_{43200} and $F_{10\%}$ strategies provide the highest NPV, roughly $234 million ($205 million under the Rho-adjusted approaches) in 2032. This is approximately 5% higher than the NPV of the default control rule ($75\%F_{MSY}$) approach for both the non-Rho and Rho-adjusted options.

This measure considers two alternatives to Option 1/No Action. The first, sub-option A, is based on a rebuilding period determined by how long it would take to rebuild form the current assessment when fishing at 75% of F_{MSY}. This result is explicitly included in Table 59, and gives a mean NPV of $222.3 million. Sub-option B is reflected by the last two columns of the table and results in about $234 million in NPV, a value that is 5 percent larger than sub-Option A. Either alternative provides far greater returns than the No Action alternative.

Figure 34 – Price (dollars/lb.) and quantity relationship for yellowtail flounder, 1996-2010 (NMFS dealer data)

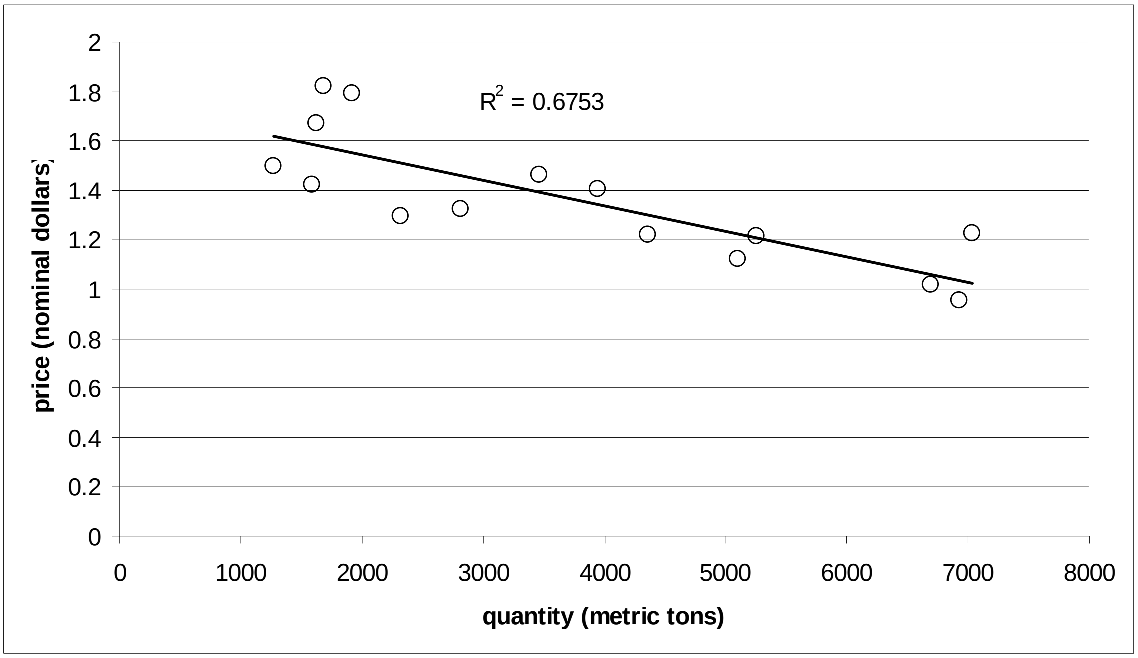
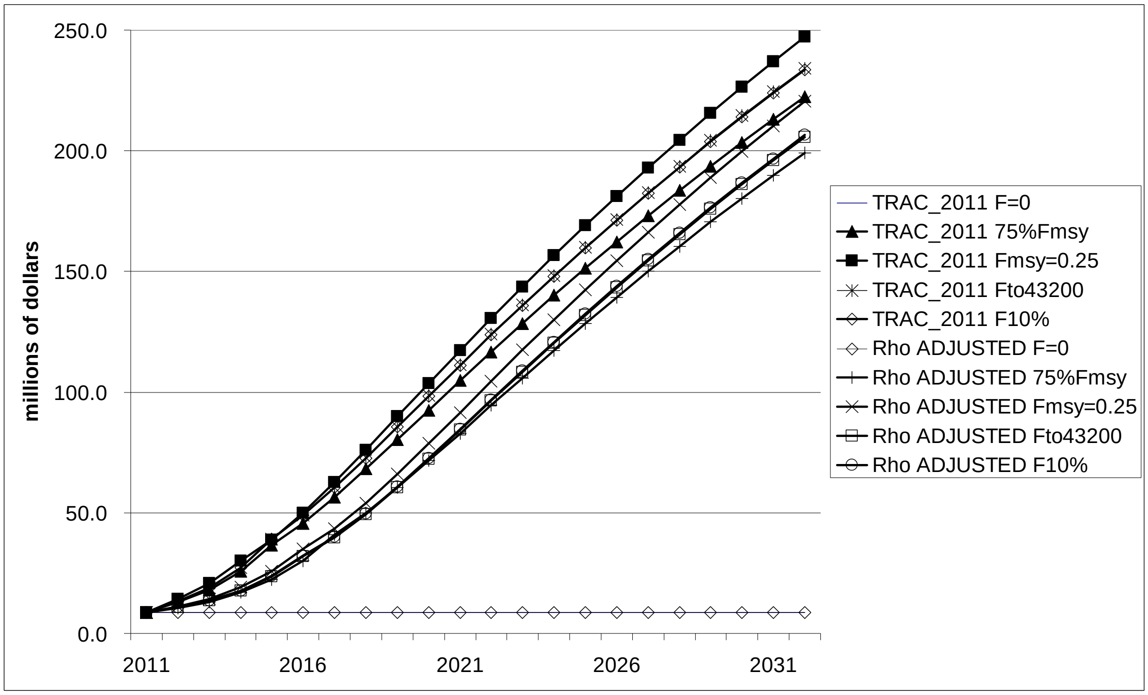


Table 59 – Net present value estimates for various rebuilding approaches

Terminal year	Discount rate	Value	F=0	75%Fmsy	TRAC_2011 Fmsy=0.25	Fto43200	F10%
		5% CI	7.4	178.1	197.5	187.6	187.2
2032	3%	*Mean*	8.8	222.3	247.2	234.2	233.7
		95% CI	10.3	259.0	287.8	272.8	272.2
					Rho ADJUSTED		
			F=0	**75%Fmsy**	**Fmsy=0.25**	**Fto43200**	**F10%**
		5% CI	7.4	160.0	176.5	164.7	165.3
2032	3%	*Mean*	8.8	199.2	220.4	205.7	206.5
		95% CI	10.3	232.1	256.7	239.6	240.5

Figure 35 – Net present value of Georges Bank yellowtail flounder rebuilding approaches



Impacts on the scallop fishery

This measure influences the size of the sub-ACL of GB yellowtail flounder allocated to the scallop fishery and thus could indirectly affect scallop fishing effort on GB.

If this option would be adopted the expectation is that GB yellowtail flounder specifications would be set at higher levels than Option 1/No Action. This could increase the amount of fishing activity on GB when compared to Option 1/No Action. If the sub-ACL is set higher it would be less likely that it would be exceeded triggering AMs, which cause effort shifts to less optimal areas with potential negative impacts on the scallop fishery. The fewer the constraints on the scallop fishery, the greater the potential to harvest all available scallop catch, the less impacts will be on fishing costs resulting in positive impacts on the revenues, profits and total economic benefits from the scallop fishery.

7.4.1.3 U.S./Canada Resource Sharing Understanding TACs

Option 1: No Action

The No Action Alternative would not specify TACs for the U.S./Canada stocks, which would result in decreased revenue in FY 2012 than under the proposed alternative. Catch of Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder would be prohibited in the Eastern U.S./Canada Area, resulting in reduced fishing opportunities. There would be less overall revenue in FY 2012 as a result of the closure of the Eastern U.S./Canada Area. The long term economic impacts of the No Action Alternative are more likely to be negative than the proposed Alternative, due to the limited fishing opportunities. However, stock rebuilding could occur more quickly, and the associated revenue that is likely to result from an increasing stock size could provide positive economic impacts in the long-term. In contract with the No Action Alternative, the Preferred Alternative would have short-term positive economic impacts as a result of fishing opportunities in the Eastern U.S./Canada Area that would be unavailable under the No Action Alternative.

Option 2: U.S. /Canada TACs (Preferred Alternative)

The economic impacts that result from the use of hard TACs for the shared stocks of GB stocks can best be described in terms of five different effects: 1) Hard TACs for cod, haddock, and yellowtail flounder will limit the total amount of catch of these stocks (landings and discards) allowed by law; 2) Associated rules such as gear restrictions, trip limits, and closures that may be implemented in order to prevent catch from exceeding the TACs will impact when and how such access to these stocks occurs; 3) Access restrictions implemented to control catch of one particular stock may indirectly impact access to other stocks; 4) Discarded fish count against the TAC; and 5) The timing and rate of landing of these stocks may impact the market for these species. These effects are described in more detail in the following section. This discussion builds upon the information contained in the affected environment (the description of the GB groundfish fishery).

The economic impacts of the proposed hard TACs are difficult to predict because the five effects noted above, the fact that the Amendment 16 regulations that implemented substantial changes in the fishery will still be relatively new in FY 2012, and the fact that these effects interact in a complex manner. The amount of fish landed and sold will not be equal to the sum of the TACs, but will be reduced as a result of discards, and may be further reduced by limitations on access to stocks that may result from the associated rules. Reductions to the value of the fish may result from fishing derby behavior and potential impact on markets.

The FY 2012 TACs for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder are lower than those specified in FY 2011 (Table 60). A portion of the U.S. TAC for GB yellowtail flounder would be allocated to the scallop fishery, which would reduce the amount of the TAC available to the commercial groundfish fishery. Based on the expected catch of GB yellowtail flounder by the scallop fishery in FY 2012, the scallop fishery would be allocated approximately 56 percent of the U.S. TAC. In FY 2011, the scallop allocation was approximately 14 percent of the U.S. TAC. As a result in the decrease of the GB yellowtail flounder TAC, and the allocation formula which is based on the expected scallop catch, the proportion of the U.S. TAC available to the groundfish fishery is reduced in FY 2012.

Table 60 - Comparison of the Proposed FY 2012 U.S. TACs and the FY 2011 U.S. TACs (mt)

Stock	U.S. TAC		Percent Change
	FY 2012	FY 2011	
Eastern GB cod	162	200	– 19 %
Eastern GB haddock	6,880	9,460	– 27 %
GB yellowtail	564	1,458	– 61 %

Providing an estimate of possible catch levels and the associated revenue, based upon multiple assumptions, may be the most useful way of estimating economic impacts. Table 61 contains estimates of FY 2009, 2010, and partial FY 2011 revenue from the U.S./Canada Management Area based on 'matched' dealer data and extrapolations based on total trip length to trip length on matched trips. Total revenue from the U.S./Canada Management Area was slightly lower in FY 2010 compared to FY 2009. Although the number of distinct vessels fishing in the U.S./Canada Area increased in FY 2010 from FY 2009, the total number of trips decreased (see also Section 5.4.1.2). The 2010 TACs were also lower than 2009, which may have contributed to the reduced revenue. In FY 2010, the total revenue from GB yellowtail was substantially lower than FY 2009, and the total revenue from Eastern GB cod, Eastern GB haddock, and GB yellowtail was approximately 1.8 million less than FY 2009.

Table 61 - Revenue from the U.S./Canada Management Area for FY 2009-2011

Stock or Species	Revenue		
	FY 2009	FY 2010	FY 2011*
Eastern GB Cod	1,079,952	884,630	364,433
Eastern GB Haddock	4,960,804	4,189,696	1,811,624
GB Yellowtail Flounder	2,585,099	1,778,235	893,533
Total revenue from U.S./Canada Stocks	8,625,855	6,852,561	3,069,590
Total revenue from all species**	37,250,820	34,467,030	18,360,422

*FY 2011 revenue includes partial fishing year information through November 3, 2011.
**Includes revenues from U.S./Canada stocks, other groundfish stocks, and non-groundfish species

There are likely increased efficiencies and decreased discards as a result of sectors, which may increase revenue and/or profitability; however, the reduced TACs in FY 2012 would likely result in reduced overall revenue. This reduced revenue would be due to both the decrease in potential landings of cod and yellowtail, as well as a loss of revenue from other stocks caught on trips to the Eastern U.S./Canada Area if vessels lose access to this area when a pertinent TAC is projected to be caught. Although the TAC will not likely limit haddock catch in the Eastern U.S./Canada Area, access to haddock may be impacted by the reduced cod and yellowtail TACs. GB winter flounder is the second most valuable stock caught in the Eastern U.S./Canada area (after haddock). If vessels are able to harvest more haddock than in previous years, some of the decreased revenue described above may be recouped through increases in haddock landings.

Potential revenue from the FY 2012 proposed TACs was estimated using an assumed price per pound, percentage of TAC caught, and an assumed discard-to-catch ratio (Table 62). Assumed discards in FY 2012 were estimated based on FY 2012 catch information, and was assumed to be 6 percent for cod, 1 percent for haddock, and 13 percent for GB yellowtail flounder. Past fishing years and FY 2010 catch information were utilized to estimate two scenarios for the percentage of TAC caught. Average price estimates are based on 2010 dealer reports submitted to the NMFS Fisheries Statistics Office. Catch and landings data are based upon VMS and dealer report data, and adjusted according to the methods described at the following internet address:
http://www.nero.noaa.gov/nero/regs/infodocs/DiscardCalculations.pdf.

Table 62 - FY 2012 Revenue Estimates from Landings of Shared Stocks from the U.S./Canada Management Area

Stock	2012 U.S. TAC	Price per lb	Scenario 1		Scenario 2	
			% of TAC Caught	FY 2012 Estimated Revenue	% of TAC Caught	FY 2012 Estimated Revenue
Eastern GB Cod	162	$1.52	75%	$382,721	100%	$510,294
Eastern GB Haddock	6,880	$1.05	15%	$2,150,036	30%	$4,300,072
GB Yellowtail Flounder	564	$1.18	75%	$957,361	100%	$1,276,482

The estimated revenues for FY 2012 are substantially lower from the FY 2010 revenues in Scenario 1, which is likely due to the reduction of the FY 2012 TACs. However, because the FY 2012 TACs are lower, a larger proportion of the U.S. TAC may be caught in FY 2012. In Scenario 2, the estimated revenues for FY 2012 are less than FY 2010 for Eastern GB cod and GB yellowtail flounder. However, the revenues for Eastern GB haddock increase compared to FY 2010 if more of the U.S. TAC is caught.

When considering the revenue associated with the landings of cod, haddock, and yellowtail flounder from the U.S./Canada Area, and the impact of interannual fluctuations in the size of the TACs, it is important to note that many other species are landed from trips to the U.S./Canada Area. If the time period during which vessels have access to the area is prolonged, there would also be increased landings of other groundfish and non-groundfish species, resulting in additional revenue. Due to the implications of catching a TAC for either the common pool or sector vessels on access to resources in addition to cod, haddock and yellowtail flounder, the reduced size of the 2012 TACs will affect total revenue in 2012. However, it is very difficult to estimate the potential revenue for *other stocks* caught on trips to the U.S./Canada Area for FY 2012 due to the fact that the number of vessels that will be fishing in the common pool and in sectors in FY 2012 is not finalized. Furthermore, it is too soon to draw conclusions regarding the impact of the Amendment 16 management regime on the U.S./Canada Area fishery. The current (2011) fishing year, which is only the second in which the majority of the groundfish fishery is fishing in sectors, is only half completed at the time of this analysis. The U.S./Canada TACs will be divided between the common pool and sectors. When the common pool cod, haddock, or yellowtail flounder TAC is projected to be caught, common pool vessels may no longer fish in the Eastern U.S. Canada Area, and lose all fishing opportunity in the Eastern Area. If the yellowtail flounder TAC is caught, a common pool vessel may still fish in the Western U.S./Canada Area, but may not retain yellowtail flounder. When a particular sector catches its TAC of Eastern U.S. cod or haddock the implications are the same (as for a common pool vessel), however when a sector catches its TAC (ACE) for GB yellowtail flounder they lose fishing opportunity throughout the yellowtail stock area. It should be noted that the amount of haddock that has been harvested from the U.S./Canada Area has been increasing since 2004, but it is unknown whether this trend will continue.

In comparison to the No Action Alternative, the Preferred Alternative would have short term negative economic impacts, due to the fact that the harvest of the shared stocks would be constrained by the TACs.

7.4.1.4 Administration of Scallop Fishery Sub-ACLs

Option 1: No Action

The current sub-ACL structure can have negative impacts on the scallop fishery if AMs are triggered and effort shift to those areas and/or seasons with lower scallop catch rates and meat weights. This could have a negative impact on the scallop resource and scallop landings and would increase the fishing costs as scallop vessels fish in less optimal areas. Scallop revenues would decline further if the effort is moved to areas with a higher percentage of smaller scallops that are usually sold at a lower price compared to larger scallops. Therefore, current sub-ACL management could result in lower profits, lower crew incomes and less economic benefits from the scallop fishery than would be expected as a result of adopting Option 2 and/or Option 3.

Option 2: Changes to Scallop Fishery Sub-ACL Administration – AM Implementation (Preferred Alternative)

This option would not be expected to have economic impacts on the groundfish fishery.

This option is expected to have positive economic impacts on the scallop fishery. If the scallop fishery exceeds their sub-ACL by less than 50% and the total ACL is not exceeded, then AMs would not trigger for the scallop fishery. This would have positive impacts on scallop fishery by preventing the effort shifts to less optimal areas and into seasons with lower meat weights. As a result, when compared to Option 1 , Option 2 would minimize the negative impacts on scallop landings, revenues and fishing costs by eliminating the AM trigger mechanism when scallop fishery does not exceed their sub-ACL by 50% or more and when total yellowtail ACL is not exceeded. There is inherent error in the projection of YT catch in the scallop fishery and this measure would allow the system to be more flexible and account for projection errors without compromising the overall catch of groundfish.

Option 3: In-Season Re-Estimation of Scallop Fishery GB Yellowtail Flounder Sub-ACL (Preferred Alternative)

This option would be expected to have positive economic benefits for the groundfish fishery and the nation. Any benefits would be limited to the years when the scallop fishery does not harvest its entire sub-ACL and the sub-ACL is re-estimated, with the result that additional quota made available to the groundfish fishery late in the year. This would increase revenues for the groundfish fishery because the amount of yellowtail flounder is likely to increase and more of the available catch will be harvested than would be the case if Option 1/No Action is adopted.

When compared to Option 1, there is the potential for negative impacts to the groundfish fishery from this measure if the in-season re-estimate is in error and projected scallop fishery catch for the year is under-estimated. Since the re-estimated sub-ACLs will be determined in mid-January and the groundfish fishery would be expected to catch all of its new sub-ACL, the total catches for the year might exceed the U.S. share of the U.S./Canada quota. Under the terms of the U.S./Canada Resource Sharing Understanding, any overage would be immediately deducted from the following year's ACL and would result in an immediate reduction in the catch available to the groundfish fishery. This is because the amount allocated to the scallop fishery is set in advance and does not vary with changes in the overall ACL. There are some elements of the ACL system that mitigate against this possibility. First, there is a buffer for management uncertainty that reduces the amount allocated to the fisheries by three percent. Second, sub-ACLs are re-specified only if the difference between the scallop fishery catch and its sub-ACL is determined to be more than 10 percent. Third, a small amount (4 percent) of the ACL is allocated to other sub-components and in FY 2010 this entire amount was not caught.

This option would re-estimate the GB yellowtail flounder sub-ACL for the scallop fishery based on data from the current fishing year. If the data show that less than 90 percent of the sub-ACL will be caught the sub-ACL would be re-specified and the underage made available to the groundfish fishery. There are no direct impacts of this measure on the scallop fishery. As long as the scallop fishery is still allocated what the fishery is expected to catch (or more, as was the case in some situations), then scallop fishing should not be constrained by YTF bycatch limits. If the scallop fishery is able to reduce YTF catch or ends up catching less YTF than projected based on a re-estimation near the end of the scallop fishing year (by January 15), than making that catch available to the groundfish fishery should not have any economic impact on the scallop fishery when compare to Option 1.

7.4.1.5 Annual Catch Limit Specifications

This measure considers two options: Option 1/No Action, and Option 2/Revised ABCs/ACLs. Option 2 includes a range of possible ABCs for GOM cod. In order to reflect the range the analyses that follow are performed for Option 1 (No Action) and Option 2 (Revised ACLs, Low and High). Note that Option 2 has Low and High ACL sub-options that change the allocation for GOM cod in order to capture the range of possible GOM cod ABCs/ACLs.

This analysis focuses on sector vessels, which constitute greater than 98% of the commercial groundfish fishery. ACE allocations are scheduled to remain relatively stable from 2011 to 2012 for all options with the exception of Georges Bank yellowtail flounder and Gulf of Maine cod (Table 63). All revenues are reported in nominal dollars. The revenues are based on VTR trips reported during FY 2010.

Table 63 –Sector ACE allocations FY2010 – 2012, live pounds

SPECIES	STOCK	2010	2011	2012 Option 1	2012 Option 2 Low	2012 Option 2 High
American plaice		5,836,518	6,697,766	6,761,576	7,063,609	7,063,609
Cod	GB	7,008,304	9,277,222	10,244,878	9,934,027	9,934,027
	GOM	9,355,985	10,408,214	10,414,634	577,611	23,097,825
Haddock	GB	83,914,795	67,575,126	56,458,165	60,120,042	60,120,042
	GOM	1,683,057	1,717,432	1,388,912	1,426,390	1,426,390
Halibut						
Ocean pout						
Pollock		34,156,917	30,530,173	27,826,739	27,597,458	27,597,458
Redfish		14,109,702	16,545,996	17,727,366	18,265,293	18,265,293
White hake		5,292,674	6,494,937	6,896,058	7,169,431	7,169,431
Windowpane	North					
	South					
Winter flounder	GB	3,980,218	4,393,893	4,909,693	7,416,348	7,416,348
	GOM	288,899	330,699	291,010	1,496,938	1,496,938
	SNEMA					
Witch flounder		1,745,117	2,669,847	3,099,699	3,128,359	3,128,359
Wolffish						
Yellowtail flounder	CCGOM	1,581,720	2,012,857	2,151,711	2,239,896	2,239,896
	GB	1,738,477	2,473,632	1,467,617	471,789	471,789
	SNE	504,685	890,684	1,216,973	1,289,727	1,289,727
GRAND TOTAL		**171,197,068**	**162,018,479**	**150,855,030**	**148,196,919**	**170,717,133**

Analyzing impacts using a quota change model

To analyze potential impacts on vessels enrolled in the sector program, a simple Monte Carlo simulation is used to estimate the catch of all 20 groundfish stocks simultaneously. This approach is conditioned on the technology, fishing practices and stock levels/catchability that existed during FY 2010. Such an approach is necessary because one cannot assume that all allocated ACE will be converted into catch. Performance during the first year of quota-based fishing demonstrated that either existing technology is inadequate to allow for targeting stocks with excess ACE capacity, or alternatively ACE allocations exceed resource availability (Table 64).

Changes in aggregate ACE allocations will not scale linearly with revenues—allocating more fish (or less) will not result in generating more or less gross revenues. For example, critical stocks such as white hake and GOM cod, both of which were somewhat constraining in FY2010, may see ACE allocations moving in opposite directions under Option 2-Low, with white hake increasing and GOM cod decreasing by nearly 95%. Option 1, which maintains allocations for most stocks, contains a roughly 40% reduction in the GB yellowtail flounder allocation. Option 2-High, on paper perhaps the most liberal of the three Options, includes an 80% reduction for this important stock. Jointness of production (the catch of several stocks simultaneously) ensures that increases and/or restrictions on the catch of one stock will have impacts on the catchability of all others, though technologies such as modified gears and improved electronics may help to overcome these limitations.

Table 64 – FY 2010 ACE allocations and catch for sector vessels

SPECIES	STOCK	ACE	2010 Catch	Utilization
American plaice		5,836,518	3,336,272	57%
Cod	GB	7008304	6,000,952	86%
	GOM	9,355,985	7,911,669	85%
Haddock	GB	83,914,795	18,266,338	22%
	GOM	1,683,057	818,239	49%
Halibut				
Ocean pout				
Pollock		34,156,917	11,483,386	34%
Redfish		14,109,702	4,702,621	33%
White hake		5,292,674	4,951,889	94%
Windowpane	North			
	South			
Winter flounder	GB	3,980,218	3,048,553	77%
	GOM	288,899	176,784	61%
	SNEMA			
Witch flounder		1,745,117	1,540,038	88%
Wolffish				
Yellowtail flounder	CCGOM	1,581,720	1,233,481	78%
	GB	1,738,477	1,632,512	94%
	SNE	504,685	351,362	70%
GRAND TOTAL		**171,197,068**	**65,454,096**	**38%**

The model draws from actual (FY 2010) fishing trips in an effort to predict future catch and gross revenues conditioned on the proposed changes in ACE allocations. VTR data is adjusted by average sector-specific discard rates and landed/live pound conversions to compute stock-specific catch for every VTR trip, along with the corresponding gross revenues. Trip characteristics such as gear type, vessel size and hailing port/state are maintained. These records are prorated to match official dealer reporting on a species and stock level. The model simulates one year of fishing by randomly selecting and arraying FY 2010 trips and summing the catches until simulated catch from one of the allocated stocks exceeds the allocated ACE. At this point the total landings for all stocks are recorded. 250 simulations are run and results are reported at the 95th percentile. Gross groundfish revenues are in constant 2010 dollars.

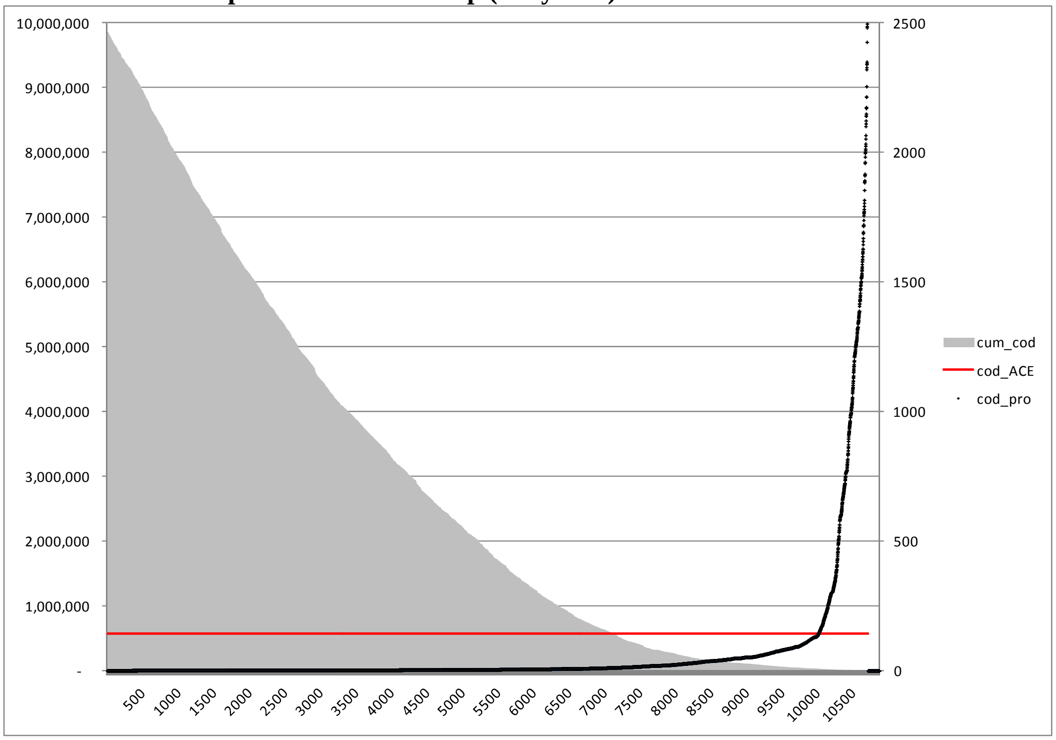
Marginal changes in quota allocations on the order of 15% or less are relatively straightforward to model as they are not likely to induce significant changes in fishing behavior or fishermen's use of technology.

In fact, continuous improvements in how fishermen use their quota and improve their fishing practices under the quota-based management system would be expected. However, two non-marginal changes in the proposed options stand out. The first is the GB yellowtail flounder allocation, which is reduced by 40% from FY 2011 under Option 1 and 81% under Option 2. The second is the 95% reduction in GOM cod allocations under Option 2-Low.

Both changes are drastic. However, it can be assumed that fishermen will change their behavior to whatever degree they may in order to redirect their efforts on stocks for which they have ample quota. Data show that it is possible to avoid both GB yellowtail flounder and GOM cod while still fishing in their respective stock areas. The critical change is in the relationship between ACE expended and total revenues generated. Essentially the question is "how much money can be generated per pound of ACE?"

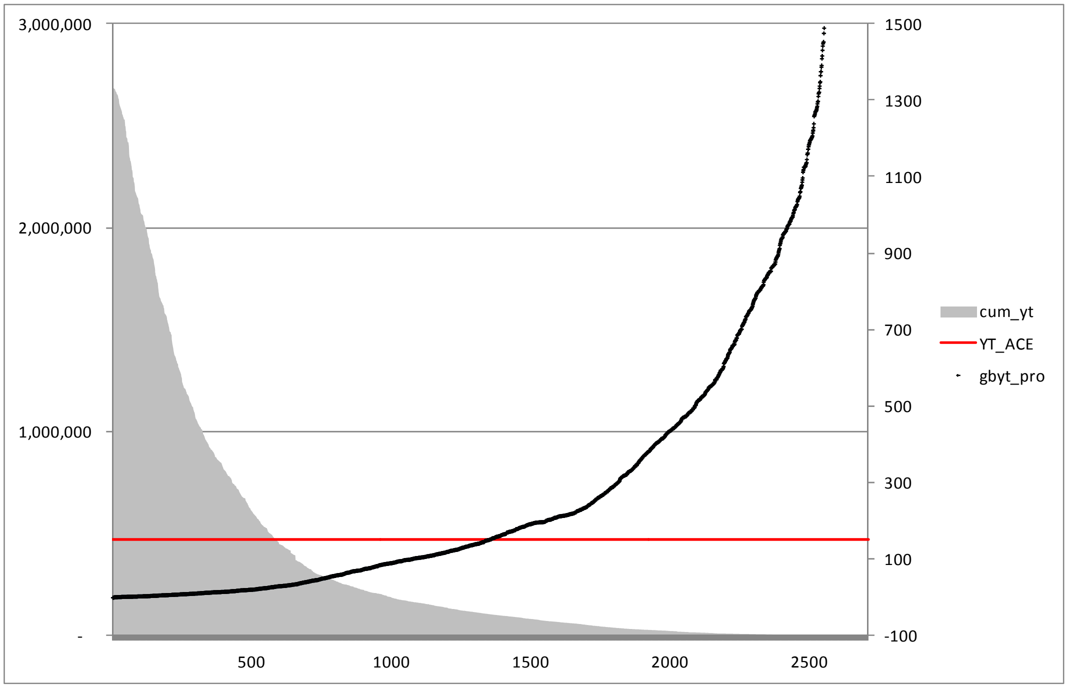
Figure 36 shows how fisherman used their cod ACE to generate gross revenues in 2010. Under a drastically reduced GOM cod quota, trips that maximize their revenues per unit ACE are most likely to occur in the future. The cod ACE to total revenue ratio that corresponds with the intersection of the cumulative ACE expenditure and the new ACE amount sets the boundary for trips that are likely to occur going forward (the intersection of the red line and boundary of grey shaded area in below figure). More than 70% of GOM cod trips generate less than $7.50 for every pound of GOM cod ACE. This indicates that most vessels catching GOM cod are targeting it rather than using it to leverage catches of other stocks. A small minority of trips, on the order of 20%, generate more than $10 per pound of GOM cod ACE. To model Option 2-Low we assume that all trips generating less than $12.16 per pound of GOM cod ACE will not occur in FY 2012. This level optimizes the catch of all other stocks conditioned on the new ACE constraints—to maximize total revenues from the groundfish resource, fishermen will need to generate on the order of $12 per pound of GOM cod ACE or more in 2012, which means targeting stocks other than cod. Note that this model does not explicitly consider changes in prices that may occur due to low ABCs for GOM cod and GB yellowtail flounder when determining which trips will take place. Large changes n prices could result in a change in the trips that are taken.

Figure 36 – Dollars generated per pound of GOM cod ACE for all trips catching GOM cod in FY 2010 (right y-axis). Cumulative ACE expenditure on each trip (left y-axis).



A similar problem is posed by GB yellowtail flounder. However, Figure 37 shows that fishermen on Georges Bank use their yellowtail flounder ACE much differently than GOM fishermen use their cod ACE. Only about 15% of trips on Georges Bank generated $10 or less in gross revenue per pound of yellowtail ACE exhausted. The equivalent percentage for GOM cod was 70%. This indicates that far more fishing trips are able to leverage their GB yellowtail flounder quota in the service of catching other stocks. In fact, on over half the trips reported as taking place on Georges Bank, fishermen were able to generate in excess of $100 per pound of yellowtail ACE. GB yellowtail is, then, much easier to avoid than GOM cod. To optimize the catch of other stocks, $29.10 in revenues need to be generated per pound of ACE, and this is the assumed threshold used when excluding trips from the model under Option 2. Note that when trips are omitted from the model, other trips will be selected with a higher probability and frequency, changing not only the distribution of the catch but the distribution of the vessels catching it.

Figure 37 – Dollars generated per pound of GB yellowtail flounder ACE for all trips catching GB yellowtail flounder in FY 2010.



Option 1: No Action

Option 1 is predicted to generate the highest gross groundfish revenue at $114 million, assuming prices remain constant at 2010 levels. This option will likely have positive net benefits relative to FY 2010 across all hailing ports and states with the exception of Rhode Island, which is may see losses of roughly 30% of gross revenues.

Table 65 – Predicted catch and gross revenue, Option 1

 # runs = 250

SPECIES	STOCK	Catch	ACE	*pct*	Gross revenue	*Percent revenue change from FY10*
American plaice	all	4,555,823	6,761,576	*67%*	$ 5,861,764	*27.5%*
Cod	GB	8,598,489	10,244,878	*84%*	$ 22,466,502	*36.3%*
	GOM	10,286,800	10,414,634	*99%*	$ 14,854,483	*23.8%*
Haddock	GB	24,984,267	56,458,165	*44%*	$ 27,430,522	*28.3%*
	GOM	1,146,057	1,388,912	*83%*	$ 1,057,557	*72.9%*
Halibut	all	81,735	-	*0%*	$ 318,590	*10.5%*
		-	-	*0%*	$ -	
Ocean pout	all	192,103	-	*0%*	$ 939	*-17.5%*
Pollock	all	16,009,575	27,826,739	*58%*	$ 14,024,913	*32.4%*
Redfish	all	7,340,072	17,727,366	*41%*	$ 3,766,582	*42.0%*
White hake	all	6,152,143	6,896,058	*89%*	$ 6,077,986	*20.5%*
Windowpane	North	467,271	-	*0%*	$ 49,183	*82.5%*
	South	337,903	-	*0%*	$ 590	*0.0%*
Winter flounder	GB	4,419,436	4,909,693	*90%*	$ 8,414,458	*46.9%*
	GOM	248,828	291,010	*86%*	$ 438,316	*32.1%*
	SNEMA	176,573	-	*0%*	$ 823,166	*10.2%*
Witch flounder	all	2,132,350	3,099,699	*69%*	$ 5,015,256	*22.0%*
Wolffish	all	53,415	-	*0%*	$ 233	*96.1%*
Yellowtail flounder	CCGOM	1,710,901	2,151,711	*80%*	$ 912,610	*16.0%*
	GB	1,467,353	1,467,617	*100%*	$ 2,498,444	*-14.5%*
	SNE	443,806	1,216,973	*36%*	$ 104,786	*34.5%*
GRAND TOTAL		**90,804,899**	**150,855,030**	***60%***	**$114,116,878**	***29.1%***

Table 66 - Predicted gross groundfish revenues by hail State, major Port and size class, Option 1

# runs = 250			**Option 1**	***Percent revenue change from FY10***
CONNECTICUT			**$3,250**	*323%*
MASSACHUSETTS			**$104,459,748**	*30%*
	>30		$0	*-100%*
	30-50		$21,277,379	*33%*
	50-75		$36,156,504	*36%*
	>75		$57,158,797	*26%*
Boston		*$19,060,538*		*32%*
Chatham		*$3,341,851*		*35%*
Gloucester		*$32,711,906*		*30%*
New Bedford		*$45,815,972*		*30%*
MAINE			**$5,402,536**	*29%*
	>30			
	30-50		$3,214,570	*52%*
	50-75		$1,729,277	*19%*
	>75		$458,689	*-25%*
Portland		*$4,426,964*		*30%*
NEW HAMPSHIRE			**$2,308,174**	*28%*
	>30			
	30-50		$2,206,646	*26%*
	50-75		$101,528	*72%*
	>75			
NEW JERSEY			**$3,598**	*0%*
NEW YORK			**$80,287**	*29%*
RHODE ISLAND			**$1,857,251**	*8%*
	>30			
	30-50		$19,731	*70%*
	50-75		$1,264,239	*23%*
	>75		$572,241	*-16%*
Point Judith		*$1,852,455*		*8%*
OTHER			**$27**	*100%*
GRAND TOTAL			**$114,114,870**	*29%*

<u>Option 2: Revised Annual Catch Limit Specifications (Preferred Alternative)</u>

Option 2-Low

Option 2-Low is estimated to have a negative economic aggregate impact, reducing gross groundfish revenues by approximately 25% relative to FY2010 and 50% relative to Option 1. GOM cod is the constraining stock.

This option does allow sustained catches for other GOM species such as plaice and witch flounder and produces only 25% less gross revenue from groundfish than observed in FY 2010. This is due to a pronounced shift in fishery location in the GOM as vessels attempt to avoid cod while maximizing revenues from other stocks (Figure 38). The conditions that allowed those high-revenue-per-cod trips to happen (environmental, abundance, etc.) are assumed to persist or be replicable, which may not be the case. Alternatively, catch rates could increase as stocks rebuild, making the model assumptions conservative. Further, there is every reason to believe that given the strong incentive to avoid GOM cod under this option, fishermen will become more adept at using their cod ACE to maximize total revenues by using improved technology and/or skill, allowing higher catches of non-binding stocks.

This option will have a negative economic impact across all size classes, gear types and nearly all hailing ports. The lone exception is Chatham, MA, which is predicted to maintain its revenue from groundfish. Behind Chatham, Boston is the only other port that is predicted to see a decline in gross groundfish revenues of less than 25%. New Hampshire is predicted to be the hardest hit by the GOM cod quotas, losing over 90% of its gross revenues. In all likelihood these nominal losses represent a shift in fishing from smaller inshore vessels. While Massachusetts as a whole is predicted so suffer only a 33% loss in gross revenues, Gloucester in particular is predicted to see over a 40% gross groundfish revenue loss. In particular it appears to be the 30-50 foot vessel size class that is likely to be most adversely affected as fishing in the GOM shifts from the nearshore areas west of the Western GOM closed area to the deeper waters further east (Figure 38). Gillnetters appear to be most negatively affected gear type (Table 72).

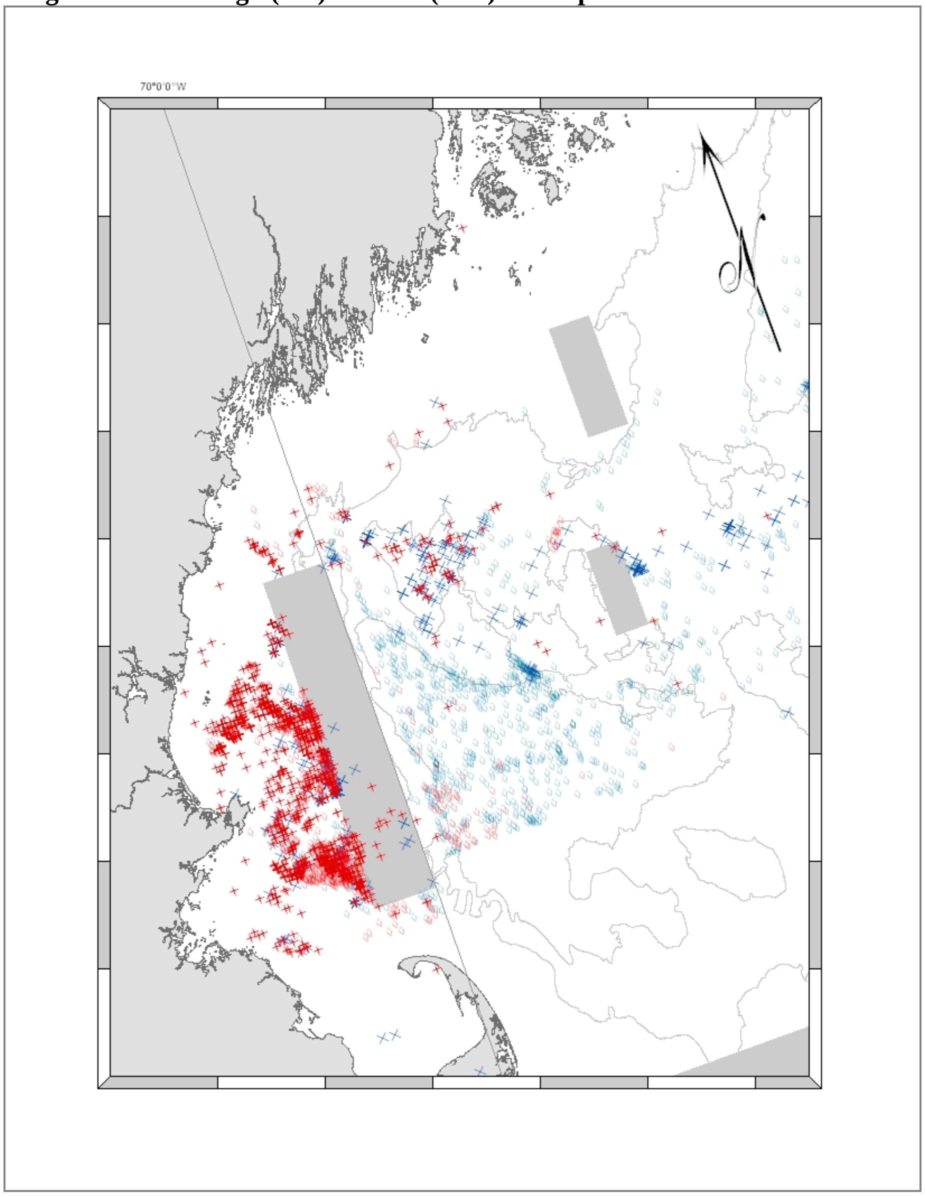
Table 67 - Predicted catch and gross revenue, Option 2 - Low
 # runs = 250

SPECIES	STOCK	Catch	ACE	*pct*	Gross revenue	*Percent revenue change from FY10*	*Percent revenue change from Option 1*
American plaice	all	3,224,950	7,063,609	*30%*	$ 4,240,364	*-7.8%*	*-28%*
Cod	GB	5,629,079	9,934,027	*39%*	$ 14,551,700	*-11.7%*	*-35%*
	GOM	577,291	577,611	*100%*	$ 811,609	*-93.2%*	*-95%*
Haddock	GB	15,742,097	60,120,042	*18%*	$ 17,216,690	*-19.5%*	*-37%*
	GOM	678,543	1,426,390	*39%*	$ 554,481	*-9.4%*	*-48%*
Halibut	all	50,913	-	*0%*	$ 207,816	*-27.9%*	*-35%*
		-	-	*0%*	$ -		
Ocean pout	all	132,556	-	*0%*	$ 338	*-70.3%*	*-64%*
Pollock	all	9,470,989	27,597,458	*23%*	$ 8,045,332	*-24.1%*	*-43%*
Redfish	all	4,549,371	18,265,293	*17%*	$ 2,341,542	*-11.7%*	*-38%*
White hake	all	4,365,190	7,169,431	*43%*	$ 4,253,578	*-15.7%*	*-30%*
Windowpane	North	276,778	-	*0%*	$ 31,671	*17.5%*	*-36%*
	South	254,766	-	*0%*	$ 1,128	*91.2%*	*91%*
Winter flounder	GB	2,073,581	7,416,348	*16%*	$ 3,928,710	*-31.4%*	*-53%*
	GOM	71,961	1,496,938	*5%*	$ 123,453	*-62.8%*	*-72%*
	SNEMA	151,147	-	*0%*	$ 866,648	*16.1%*	*5%*
Witch flounder	all	1,262,195	3,128,359	*29%*	$ 2,897,564	*-29.5%*	*-42%*
Wolffish	all	32,589	-	*0%*	$ 2	*-98.7%*	*-99%*
Yellowtail flounder	CCGOM	861,911	2,239,896	*33%*	$ 471,702	*-40.0%*	*-48%*
	GB	397,078	471,789	*57%*	$ 514,586	*-82.4%*	*-79%*
	SNE	327,159	1,289,727	*20%*	$ 71,660	*-8.0%*	*-32%*
GRAND TOTAL		**50,130,142**	**148,196,919**	***34%***	**$ 61,130,575**	***-30.8%***	***-46%***

Table 68 - Predicted gross groundfish revenues by hail state, major port and size class, Option 2-Low

# runs = 250		**Option 2 - Low**	***Percent revenue change from FY10***	***Percent revenue change from Option 1***
CONNECTICUT		**$8,921**	*1062%*	*175%*
MASSACHUSETTS		**$57,950,657**	*-28%*	*-45%*
	>30	$0	*-100%*	
	30-50	$8,021,622	*-50%*	*-62%*
	50-75	$17,331,292	*-35%*	*-52%*
	>75	$36,828,697	*-19%*	*-36%*
	Boston	*$11,530,125*	*-20%*	*-40%*
	Chatham	*$2,393,955*	*-4%*	*-28%*
	Gloucester	*$17,521,848*	*-31%*	*-46%*
	New Bedford	*$25,305,476*	*-28%*	*-45%*
MAINE		**$1,930,104**	*-54%*	*-64%*
	>30			
	30-50	$787,337	*-63%*	*-76%*
	50-75	$838,413	*-42%*	*-52%*
	>75	$304,355	*-50%*	*-34%*
	Portland	*$1,649,427*	*-52%*	*-63%*
NEW HAMPSHIRE		**$158,950**	*-91%*	*-93%*
	>30			
	30-50	$158,950	*-91%*	*-93%*
	50-75	$0	*-100%*	*-100%*
	>75			
NEW JERSEY		**$7,196**	*100%*	*100%*
NEW YORK		**$61,314**	*-1%*	*-24%*
RHODE ISLAND		**$1,008,394**	*-42%*	*-46%*
	>30			
	30-50	$2,084	*-82%*	*-89%*
	50-75	$677,100	*-34%*	*-46%*
	>75	$328,380	*-52%*	*-43%*
	Point Judith	*$1,004,293*	*-42%*	*-46%*
OTHER		**$13**	*0%*	*-50%*
GRAND TOTAL		**$61,125,550**	*-31%*	*-46%*

Figure 38 – Fishing locations for high (red) and low (blue) cod trips. VTR is + and Observer is <>



Option 2-High

Option 2-High is estimated to generate about 16% less gross revenue from groundfish than Option 1, at $95.6 million, but is estimated to generate positive economic impacts relative to the FY2010 fishing year, as higher quotas for binding stocks like white hake and GOM cod translate into 20-30% higher gross groundfish revenues. GB yellowtail and GOM cod are predicted to be the binding quota stocks under this option.

Table 69 – Predicted catch and gross revenue, Option 2 - High

 # runs = 250

SPECIES	STOCK	Catch	ACE	*pct*	Gross revenue	*Percent revenue change from FY10*	*Percent revenue change from Option 1*
American plaice	all	4,414,191	7,063,609	*62%*	$ 5,797,353	*26.1%*	*-1%*
Cod	GB	6,945,753	9,934,027	*70%*	$ 18,096,727	*9.8%*	*-19%*
	GOM	10,071,773	23,097,825	*44%*	$ 14,522,636	*21.0%*	*-2%*
Haddock	GB	19,290,494	60,120,042	*32%*	$ 20,967,428	*-1.9%*	*-24%*
	GOM	1,418,209	1,426,390	*99%*	$ 1,221,174	*99.6%*	*15%*
Halibut	all	73,322	-	*0%*	$ 344,376	*19.5%*	*8%*
		-	-	*0%*	$ -		
Ocean pout	all	163,837	-	*0%*	$ 1,261	*10.8%*	*34%*
Pollock	all	14,784,328	27,597,458	*54%*	$ 12,916,807	*21.9%*	*-8%*
Redfish	all	6,092,781	18,265,293	*33%*	$ 3,219,909	*21.4%*	*-15%*
White hake	all	6,080,081	7,169,431	*85%*	$ 5,782,972	*14.7%*	*-5%*
Windowpane	North	413,660	-	*0%*	$ 61,438	*128.0%*	*25%*
	South	316,674	-	*0%*	$ 519	*-12.0%*	*-12%*
Winter flounder	GB	2,754,011	7,416,348	*37%*	$ 5,295,500	*-7.6%*	*-37%*
	GOM	228,797	1,496,938	*15%*	$ 410,320	*23.6%*	*-6%*
	SNEMA	151,814	-	*0%*	$ 563,025	*-24.6%*	*-32%*
Witch flounder	all	2,049,469	3,128,359	*66%*	$ 4,729,652	*15.0%*	*-6%*
Wolffish	all	47,853	-	*0%*	$ 236	*98.7%*	*1%*
Yellowtail flounder	CCGOM	1,812,185	2,239,896	*81%*	$ 995,570	*26.5%*	*9%*
	GB	450,828	471,789	*96%*	$ 567,359	*-80.6%*	*-77%*
	SNE	477,359	1,289,727	*37%*	$ 113,136	*45.2%*	*8%*
GRAND TOTAL		**78,037,421**	**170,717,133**	***46%***	**$ 95,607,397**	***8.2%***	***-16%***

Table 70 - Predicted gross groundfish revenues by hail State, major Port and size class, Option 2-High

# runs = 250		**Option 2 - High**	***Percent revenue change from FY10***	***Percent revenue change from Option 1***
CONNECTICUT		**$6,440**	*739%*	*98%*
MASSACHUSETTS		**$86,822,351**	*8%*	*-17%*
	>30	$14,892	*-25%*	
	30-50	$16,070,200	*0%*	*-24%*
	50-75	$30,276,528	*14%*	*-16%*
	>75	$45,948,418	*1%*	*-20%*
Boston		*$17,229,686*	*19%*	*-10%*
Chatham		*$2,996,411*	*21%*	*-10%*
Gloucester		*$30,209,424*	*20%*	*-8%*
New Bedford		*$32,757,610*	*-7%*	*-29%*
MAINE		**$5,138,086**	*23%*	*-5%*
	>30			
	30-50	$3,035,355	*43%*	*-6%*
	50-75	$1,651,764	*14%*	*-4%*
	>75	$450,967	*-26%*	*-2%*
Portland		*$4,204,255*	*23%*	*-5%*
NEW HAMPSHIRE		**$2,163,324**	*20%*	*-6%*
	>30			
	30-50	$2,095,679	*20%*	*-5%*
	50-75	$67,645	*15%*	*-33%*
	>75			
NEW JERSEY		**$3,598**	*0%*	*0%*
NEW YORK		**$100,553**	*62%*	*25%*
RHODE ISLAND		**$1,372,767**	*-20%*	*-26%*
	>30			
	30-50	$9,294	*-20%*	*-53%*
	50-75	$1,041,045	*1%*	*-18%*
	>75	$321,584	*-53%*	*-44%*
Point Judith		*$1,368,671*	*-20%*	*-26%*
OTHER		**$27**	*100%*	*0%*
GRAND TOTAL		**$95,607,147**	*8%*	*-16%*

Summary of ACL impacts

Relative to FY 2010, Option 1 and Option 2-High are predicted to have net positive economic impacts for vessels landing groundfish from all states with the exception of Rhode Island, which may see declines in gross revenues from groundfish under Option 2-High. This is due to the reduced Georges Bank yellowtail flounder ACE. The quota change model excluded a number of directed yellowtail trips on Georges Bank made by vessels from Point Judith. As the model makes no assumptions about vessel-level behavior changes, these trips were assumed to be lost and the unused ACE is assumed to be available for leasing. Option 2-High also will decrease gross revenues from fishing for the port of New Bedford, though these reductions are offset by increases in gross revenues elsewhere in Massachusetts, particularly in Gloucester.

Option 2-Low will have negative economic impacts across all ports, size classes and gear types. Small vessels and gillnetters in the inshore Gulf of Maine are predicted to be most adversely affected. Under this Option, New Hampshire is predicted to lose over 90% of its gross revenues relative to FY 2010.

These estimates are for changes in gross revenues from fishing, and they do not account for corresponding changes in owner-level income resulting from ACE leasing.

Table 71 – Summary of impacts by hail State, relative to FY2010

	Option 1	Option 2-Low	Option 2-High
CONNECTICUT	-	-	-
MASSACHUSETTS	30%	-28%	8%
MAINE	29%	-54%	23%
NEW HAMPSHIRE	28%	-91%	20%
NEW JERSEY	-	-	-
NEW YORK	29%	-1%	62%
RHODE ISLAND	8%	-42%	-20%

Table 72 – Summary of impacts by gear type

	Option 1		Option 2 - Low		Option 2 - High	
Otter trawl	$100,626,172	*88.2%*	$56,897,259	*93.1%*	$82,770,109	*86.6%*
Gillnet	$11,009,495	*9.6%*	$2,688,302	*4.4%*	$10,470,839	*11.0%*
Longline	$2,479,204	*2.2%*	$1,539,989	*2.5%*	$2,366,200	*2.5%*
GRAND TOTAL	$114,114,870		$61,125,550		$95,607,147	

Table 73 – Summary of impacts by vessel size class

	Option 1		Option 2 - Low		Option 2 - High	
>30	$69,185	*0.1%*	$0	*0.0%*	$60,698	*0.1%*
30-50	$16,574,192	*14.5%*	$4,788,396	*7.8%*	$15,757,884	*16.5%*
50-75	$39,278,610	*34.4%*	$18,867,096	*30.9%*	$33,061,249	*34.6%*
>75	$58,192,884	*51.0%*	$37,470,058	*61.3%*	$46,727,317	*48.9%*
GRAND TOTAL	$114,114,870		$61,125,550		$95,607,147	

Table 74 – Summary of impacts by hailing port state

	Option 1		Option 2 - Low		Option 2 - High	
CONNECTICUT	$3,250	*0.0%*	$8,921	*0.0%*	$6,440	*0.0%*
MASSACHUSETTS	$104,459,748	*91.5%*	$57,950,657	*94.8%*	$86,822,351	*90.8%*
MAINE	$5,402,536	*4.7%*	$1,930,104	*3.2%*	$5,138,086	*5.4%*
NEW HAMPSHIRE	$2,308,174	*2.0%*	$158,950	*0.3%*	$2,163,324	*2.3%*
NEW JERSEY	$3,598	*0.0%*	$7,196	*0.0%*	$3,598	*0.0%*
NEW YORK	$80,287	*0.1%*	$61,314	*0.1%*	$100,553	*0.1%*
RHODE ISLAND	$1,857,251	*1.6%*	$1,008,394	*1.6%*	$1,372,767	*1.4%*
GRAND TOTAL	$114,114,843		$61,125,537		$95,607,120	

7.4.2 Commercial and Recreational Fishery Measures

7.4.2.1 Management Measures for SNE/MA Winter Flounder

Option 1: No Action (Preferred Alternative)

If this option is adopted groundfish fishing vessels will not be allowed to land SNE/MA winter flounder. No revenues will result from any catches of this stock as all will be discarded. The economic impacts of this measure are primarily the lost revenues that result from this prohibition. Based on a value of $2/ per pound for winter flounder in FY 2010, over the three years covered by the specifications proposed in section 4.1.5.2, winter flounder landings of 1,081 mt would be foregone with potential revenues of about $4.7 million. This likely underestimates the loss in revenue as the prohibition may lead to reduced groundfish fishing activity and the loss of revenues from other species caught on those trips. When compared to Option 2, this option would result in reduced groundfish fishing revenues for vessels with federal permits.

Option 2: Allocate SNE/MA Winter Flounder to the Groundfish Fishery

If this option would be adopted, vessels with federal groundfish permits could potential land an additional 1,081 mt of winter flounder during FY 2012- 2014. Based on FY 2010 prices, this would increase revenues by about $4.7 million when compared to Option 1/No Action. This may under-estimate the increase in revenues as other species may be caught on additional trips that are taken to target winter flounder.

7.4.2.2 Scallop Catch of Yellowtail Flounder in Access Areas – Modification of Restrictions

Option 1: No Action

According to the current regulations, when the Georges Bank access area catches equal the 10% yellowtail flounder TAC set aside, the area is closed to further scallop fishing. This bycatch cap increases incentive of derby fishing having negative impacts on the scallop fishery. Some of these negative impacts are reduced because the plan compensates vessels for unused access area trips if an area closes, by allowing vessels with unused trips to transfer all or a portion of them to fish for scallops in open areas. However, the allocation of DAS for the unused trips do not usually provide a full compensation for the access area pounds and have resulted in losses for vessels that were not able to take their access area trips before the areas are closed. This factor has led to derby fishing and resulted in the premature closure of GB access areas several years (for example, in 2006, 2008 and 2009) as the yellowtail catches reached 10% of the TAC set-aside within a short period of time. The increase in the supply of scallops within a short time frame lowered the scallop ex-vessel prices, reduced revenues and economic benefits from the scallop fishery.

Allocation of open area DAS for unused trips does not always eliminate derby fishing because the number of open area DAS are determined according to a prorated amount to achieve an equal amount of scallop mortality per DAS. Unless the scallop biomass and mortality could be predicted with certainty and were equivalent in open versus access areas, DAS compensations are bound to either fall short of or exceed the amount of pounds (18,000 lb.) that could be landed from the access areas. For example, Framework 19 estimated that the compensation for Nantucket Lightship in 2008 would be 7.7 DAS and 7.9 DAS for Closed Area II trips in 2009. According to the recent estimates, LPUE in open areas was 1,624 in 2008 fishing year and 2,065 in 2009 fishing year. Thus scallop pounds that could be landed in the open areas with the prorated DAS would be about 12,420 lb. in 2008 and 16,068 lb. in 2009, less than the 18,000 pounds that could be landed form access areas. This resulted in derby fishing by vessels trying to avoid losses from a potential area closing and consequent closing of NL in 2008 and then of CAII in 2009, when that area closed only two weeks after it opened to fishing. Derby fishing probably has played a major role in reducing the scallop ex-vessel prices to their lowest level ($6.29 versus $6.85 during the whole year) in 2009. Compared to Option 2 (elimination of the bycatch cap in access areas), the Option 1/No Action would be expected to have more negative impacts on the scallop fishery due to negative consequences of derby fishing.

Option 2: Eliminate the 10% Yellowtail Flounder Bycatch TAC in Scallop Access Areas on Georges Bank (Preferred Alternative)

This measure would not be expected to have economic impacts on the groundfish fishery.

The elimination of the 10% yellowtail bycatch TAC and in-season closure of the access areas would be expected to greatly reduce the incentive for derby fishing, thus this alternative would be expected to have positive impacts on the scallop fishery. There is still an overall YT sub-ACL the scallop fishery is limited to for both YT stocks, but it is not restricted to access area fishing, and includes YT bycatch from both access areas and open areas.

If the YT sub-ACL is exceeded, pre-identified areas are closed to the scallop fishery for a specified period of time based on the magnitude of the YT overage the year after an overage, not in-season. Implementation of the closure in the subsequent year, rather than in-season, are expected to greatly reduce the race to fish and minimize the negative impacts on prices and revenues associated with derby style fishing -- as long as elimination of an in-season closure doesn't increase the yellowtail bycatch rate. Furthermore, with the AM closures, negative impacts on the scallop resource and landings could be minimized and the fishing costs could be reduced if the closure schedule is designed such that effort would shift to more optimal seasons and areas when the scallop meat weights are larger.

There may be an increased risk of exceeding the overall sub-ACL if the 10% bycatch TAC in access areas in eliminated and the scallop fishery catches more YT in access areas than projected. Without the in-season closure it is possible that total bycatch for the year would be higher, triggering longer AM closures in the subsequent year. If this is the case, this alternative could cancel out the positive economic impacts of eliminating the 10% bycatch TAC in access areas. To minimize this risk, scallop vessels can continue to participate in voluntary bycatch avoidance programs in access areas as well as other non-regulated fishing practices that are expected to reduce bycatch such as: a reduction in the hanging ratio to 2:1, reduction of number of rings between the club stick and twine top, shorter tow distance/duration and hanging the dredge at the side of the vessel before haul back to allow yellowtail escapement. Despite the fact that elimination of the bycatch cap could increase the risk of exceeding the total sub-ACL and extend the length of AM closures the following year, this alternative would still be expected to have positive impacts on the scallop fishery compared to Option 1/No Action by reducing the incentive for derby fishing.

7.4.2.3 Atlantic Wolffish Landing Limit

Option 1: No Action (Preferred Alternative)

If this option is adopted the groundfish fishery will not benefit from any revenues from landing Atlantic wolffish. Based on the sub-ACL for the fishery that is proposed in section 4.1.5.2, the maximum landings that would be allowed before an AM is triggered would be 73 mt. Wolffish is a relatively low value species, so this option results in a loss of about $80,000. This species is not typically a target species so it is not likely that this measure would result in additional losses in revenues from changes in fishing effort. When compared to Option 2 this measure would result in less revenue for groundfish fishing vessels, but the revenues are so small it would have little effect on the industry.

Option 2: Revised Atlantic Wolffish Possession Limit

If adopted this measure would allow landing one wolffish per trip. The maximum revenues that are possible would be about $80,000 based on the groundfish ACL for this stock proposed in section 4.1.5.2. It is likely that revenues would be less than this if this measure was approved since only one fish per trip could be landed. While this measure would marginally increase revenues the differences between this option and Option n1/No Action are slight.

7.4.2.4 Common Pool Restricted Gear Areas

Option 1: No Action

This measure would continue the requirement that in large areas of SNE and on western GB, common pool vessels are required to use selective gear that reduces catches of flounders and cod. This measure makes fishing by common pool vessels less efficient. In the SNE area, the measure may be the primary reason that common pool vessels landed only 15 mt of SNE/MA yellowtail flounder and caught only 26 percent of their sub-ACL for this stock in FY 2010. If this option is adopted, common pool vessel revenues would continue to be restricted. Compared to Option 2 this measure would result in reduced revenues for groundfish fishing vessels.

This measure may also increase costs for common pool vessels since if the vessel operator wishes to fish in the RGAs certain gear is required.

Option 2: Removal of Common Pool Restricted Gear Areas (Preferred Alternative)

If adopted this measure would be expected to increase revenues for common pool fishing vessels when compared to Option 1, particularly for those vessels that fish in SNE. The most likely effect would be to increase common pool landings of SNE/MA yellowtail flounder; common pool vessels caught only 26 percent of this stock in FY 2010. Based on this percentage of catch and the

ACLs proposed in section 4.1.5.2, adopting this measure might result in increasing landings of this stock by 129 mt in FY 2012, worth an estimated $370,000. It may also reduce costs since vessel operators would not be required to purchase selective gear to fish in these areas.

7.4.2.5 Accountability Measures

In the following sections, the economic impacts of the AM options under consideration estimate changes in fishing vessel revenue. The analyses assume first, that a particular AM would be adopted; second, that the appropriate ACL is exceeded, triggering the AM provisions; and third, that recent fishing activity continues into the near future.

Option 1: No Action

If this measure is adopted any impacts of the AMs would be borne by common pool fishing vessels. The impacts of any AM depend not only on whether an ACL is exceeded and the AM is triggered but in the reaction of fishermen to the possibility that the AM will be implemented. If there is strong belief that this will occur it can lead to derby effects as fishermen rush to fish before the AM is implemented.

The AMs for ocean pout and both windowpane flounder stocks would not be expected to have any economic impacts. Possession of these stocks is prohibited and so the AM – which, as written, allows NMFS to adjust the trip limit for these stocks – would not have any economic impacts.

The AM for Atlantic halibut also allows NMFS to adjust trip limits. Since possession is limited to one fish per trip, the only trip limit adjustment would be to ban possession. Total common pool revenues from Atlantic halibut in FY 2010 were only $25,000, or about 1 percent of common pool groundfish revenues (see http://www.nero.noaa.gov/ro/fso/reports/Sector_monitoring/Table_9.pdf). This is the upper limit on the reduction in common pool revenues that could result from this AM. Because halibut is not a target species fishing effort is not likely to be redistributed ifs this AM is implemented and the existence of the AM is not likely to lead to derby effects.

The No Action AMs for Atlantic wolffish and SNE/MA winter flounder require closing of statistical areas to common pool groundfish fishing if they are implemented. Unlike the AMs for ocean pout, windowpane flounders, and Atlantic halibut, these AMs could lead to derby effects since fishing opportunities are severely constrained if the AM is implemented. The economic effects would likely be greatest if the wolffish AM is implemented.

If the wolffish ACL is exceeded, common pool fishing activity is prohibited using sink gillnets, trawls, or longlines in statistical areas 513, 514, 521, and 522. In CY 2009 and CY 2010 these areas accounted for about 50 percent of revenues on trips that landed regulated groundfish for vessels that joined the common pool (in FY 2010). The potential loss of such a large portion of revenues by common pool vessels would create a strong incentive to fish before the AM would be triggered, leading to derby effects. There are also limited alternatives in other fisheries for the vessels that fish in these areas. While only 30 percent of the wolffish ACL was caught in FY 2010 and it would appear that implementing the AM is unlikely the revenue losses would be large enough that fishermen may be unwilling to risk being closed out of these areas. While these impacts would be large for the vessels in the common pool, in FY 2010 common pool groundfish fishing revenues were only $2.1 million out of a total of $82.7 million, or 2.5 percent of groundfish revenues. For the fishery as a whole, then, this AM would have minor effects on groundfish revenues.

The AM for SNE/MA winter flounder closes six statistical areas in the SNE/MA winter flounder stock area (521,526,537,612,613), but only for common pool vessels. In CY 2009 and CY 2010 these areas accounted for about 32 percent of revenues on trips landing regulated groundfish that were taken by vessels that joined sectors in FY 2010. While there may be more opportunities to participate in other fisheries in these areas if the AM is implemented this still places a large part of common pool revenues at risk and may encourage derby fishing behavior. While as in the GOM the impacts on common pool groundfish revenues may be large the loss in revenues for the groundfish fishery as a whole would be expected to be minor.

When compared to the other options this measure would limit economic impacts to the small portion of the fleet that fishes in the common pool. If the common pool remains a small component of the fishery then the reductions in revenue should these AMs be implemented would be expected to be on the order of less than 2 percent of total groundfish revenues. For vessels that are in the common pool, however, the loss of up to 50 percent of revenues would be devastating.

Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish (Preferred Alternative for Windowpane Flounders and Ocean Pout Only)

The economic impacts of this area-based AM option are evaluated by estimating the revenues caught in the areas in FY 2010 using gear that would not be allowed if the AM is adopted and implemented. If all of these revenues were displaced by the AM it would represent the maximum change in revenues expected. Economic impact estimates are based on the types of fishing trips likely to be affected as reported in the VTR and observer databases. No distinction is made between sector and common pool vessels. All revenues are reported in nominal dollars. VTR trips reporting latitude and longitudes falling inside the affected areas are used for estimating economic impacts, drawing from FY 2010 data only. This is because the change to sector management in FY 2010 may have changed the distribution of fishing effort. Data used for assessing the catch rates of selective gears (separator trawl, Ruhle trawl) are from FY 2010 and FY 2011 to date.

The AM areas considered here are relatively small and therefore the trips with positions falling inside their boundaries comprise only a sample population of impacted trips. For FY 2010, approximately half of all trips reported latitude and longitude data and it is impossible to determine if these coordinate data are biased with respect to position. As the location of an entire trip is coded at one particular point, these coordinate data are assumed to be approximate and to broadly represent the type and level of activities in these areas. All gross revenues reported here are prorated from the sample population to total population estimate by inflating revenues by the appropriate percentage based on trips reporting and not reporting lat/lon data for the gear type and statistical area(s) best corresponding to each proposed management area. Generally about half the trips did not report a position. Gross revenues are in nominal (2010) dollars as reported in either the VTR or observer database, and encompass all revenues from groundfish permitted vessels on trips on which at least one pound of groundfish was landed.

The following analyses assume that the measure would be adopted and that the ACLs are exceeded, which trigger the restrictions. For windowpane flounder, the assumption is that both stock specific ACLs are exceeded and so both AM areas are adopted at the same time - the impacts reflect the revenue changes if fishing is restricted in both areas.

Table 75 – Number of trips reporting positional data, with revenues generated

	Reporting lat/lon	Not reporting lat/lon
number trips	13,192	8,374
total revenues	$ 113,081,991	$ 115,855,503
% total revenues	49%	51%

Windowpane flounder and ocean pout:
If adopted, this option would implement trawl gear restrictions in certain areas during either year 2 or year 3 based on ACL overages that occurred in year 1.

If this option were triggered, both common pool and sector-based vessels would have the choice of either using an approved selective gear or not fishing in the area. Two sub-options are considered, the first with smaller areas and the second with larger areas.

Sub-option 1: Smaller areas
Nearly $7 million dollars of total revenues by groundfish fishing vessels are estimated from trips in these areas. The majority of these revenues (93%) were reported on trips hailing from New Bedford, MA (Table 75). Note also that $6 million dollars in gross revenue from vessels hailing from New Bedford is not insignificant—it is nearly 10% of the $65 million landed in that port by permitted groundfish vessels in FY 2010.

Table 76 – Gross revenues from VTR trips reported inside Sub-option 1 (smaller areas) during FY 2010

PORT	GROSS REVENUE
Boston, MA	$ 169,802
Gloucester, MA	$ 82,521
New Bedford, MA	$ 6,136,129
Nantucket, MA	$ 357
Montauk, NY	$ 138,882
Newport, RI	$ 13,887
Pt Judith, RI	$ 410,124
Grand Total	$ 6,951,702

Only a portion of these revenues will be affected by this option, as vessels may still elect to fish inside these areas with selective gear. Selective gears have not been used extensively in these areas thus far, indicating that it is generally more profitable to fish with traditional gears than selective gears. Whether it will be more profitable to fish in other areas or to continue fishing inside these areas with selective gears depends on the profitability of other fishing options. Given the relatively small size of these areas, the additional trip costs (steaming time, etc.) are likely negligible. The true cost will be the difference between the profitability of fishing inside these areas and the profitability of making those trips in the next best outside area.

The use of selective gear does substantially change the composition of the catch inside the windowpane and ocean pout (small) areas. Both VTR reported and observer data collected from tows inside the areas show a much higher proportion of haddock and lower proportion of flatfish relative to traditional trawl gears.

Table 77 – Proportion of kept catch on observed and VTR-reported trips using selective (separator, Rhule) and traditional (otter) trawl gears inside the small windowpane AM option areas

	Observer				VTR			
	selective		**traditional**		**selective**		**traditional**	
cod	$ 23,194	4.1%	$ 155,022	13.5%	$ -	0.00%	$ 525,406	7.6%
haddock	$ 510,581	91.1%	$ 656,658	57.3%	$ 64,553	100.00%	$ 3,128,320	45.4%
flats	$ 24,012	4.3%	$ 259,142	22.6%	$ -	0.00%	$ 1,624,265	23.6%
pollock	$ 117	0.0%	$ 9	0.0%	$ -	0.00%	$ 3,522	0.1%
white hake	$ -	0.0%	$ 6	0.0%	$ -	0.00%	$ 5,591	0.1%
skates	$ 1,688	0.3%	$ 32,881	2.9%	$ -	0.00%	$ 1,377,939	20.0%
other	$ 783	0.1%	$ 36,106	3.2%	$ -	0.00%	$ 10,601	3.1%
squids	$ -	0.0%	$ 5,255	0.5%	$ -	0.00%	$ 211,506	0.2%
Grand Total	$ 560,376		$ 1,145,079		$ 64,553		$ 6,887,148	

Average revenues per tow for the selective gears in these areas were approximately 31% higher than per-tow revenues using traditional gears on observed trips, though fewer tows were observed. Whether or not fisherman will chose to use the selective gear in these areas remains to be seen, but while this option appears to affect $7 million in revenues it appears that nearly all of that revenue can be made up for at relatively low cost by using the approved selective gears or moving to a different fishing location.

Table 78 – Revenue per tow by two types of trawl gears from tows observed inside windowpane small areas

Trawl net	Revenue per tow	number tows
selective	$ 2,536	223
traditional	$ 1,918	597

Sub-option 2: Larger areas

Approximately $15 million in estimated gross revenues is estimated to have come from these areas, with 75% of these revenues coming from New Bedford, MA. Pt. Judith is the next-most affected port, with almost $1.7 million in estimated gross revenues coming from these areas.

Table 79 - Gross revenues from VTR trips reported inside Sub-option 2 (larger areas) during FY 2010

Port	Gross revenue
Stonington, CT	$ 42,178
Boston, MA	$ 299,027
Gloucester, MA	$ 256,697
New Bedford, MA	$ 11,717,014
Nantucket, MA	$ 26,708
Pt Pleasant, NJ	$ 44,777
Cape May, NJ	$ 11,698
Monmouth, NJ	$ 15,571
Belford, NJ	$ 517,276
Belmar, NJ	$ 5,630
Freeport, NY	$ 139,899
Greenport, NY	$ 20,750
Montauk, NY	$ 605,159
Point Lookout, NY	$ 242,128
Newport, RI	$ 59,075
Pt Judith, RI	$ 1,670,090
Grand Total	$ 15,685,911

Selective gears again substantially change the composition of the catch inside the windowpane and ocean pout large areas. Both VTR reported and observer data collected from tows inside the areas show a much higher proportion of haddock and lower proportion of flatfish relative to traditional trawl gears.

Table 80 - Proportion of kept catch on observed trips using selective (separator, Ruhle) and traditional (otter) trawl gears inside the large windowpane AM option areas

	Observer				VTR			
	selective		**traditional**		**selective**		**traditional**	
cod	$ 75,181	7.4%	$ 294,954	12.5%	$ 59,338	11.80%	$ 984,926	6.5%
haddock	$ 818,668	80.6%	$ 880,722	37.3%	$ 347,798	69.00%	$ 4,970,878	32.7%
flats	$ 48,349	4.8%	$ 581,598	24.6%	$ 66,019	13.10%	$ 4,373,327	28.8%
pollock	$ 56,472	5.6%	$ 4,783	0.2%	$ 2,925	0.60%	$ 35,403	0.2%
white hake	$ 38	0.0%	$ 2,054	0.1%	$ -	0.00%	$ 61,362	0.4%
skates	$ 4,450	0.4%	$ 266,161	11.3%	$ 1,217	0.20%	$ 2,615,678	17.2%
other	$ 11,972	1.2%	$ 229,621	9.7%	$ -	5.30%	$ 519,877	10.7%
squids	$ -	0.0%	$ 101,112	4.3%	$ 26,745	0.00%	$ 1,620,419	3.4%
Grand Total	$ 1,015,131		$ 2,361,006		$ 504,042		$ 15,181,869	

As with the small windowpane areas, catch rates per observed tow were about 33% higher with the selective gears than with traditional gear for observed tows in the large areas. As with the smaller areas, it is not clear that all revenues from these areas will be lost if the AMs are triggered, as vessel operators may choose to use selective gear, or may fish in other areas.

Table 81 - Revenue per tow by two types of trawl gears from tows observed inside windowpane large areas

Trawl net	Revenue per tow	number tows
selective	$ 2,452	417
traditional	$ 1,804	1309

In summary, implementing the small windowpane flounder and ocean pout AM area could affect $7 million in groundfish revenue; while the larger area could affect $15 million in revenue. Not all of these revenues are likely to be foregone, as fishermen can choose to fish in the areas with selective gear or could fish in other areas. The delay in implementation of the restriction will give fishermen some time to plan their operations to mitigate the economic impacts of the measure.

This AM will have negative economic impacts compared to the Option 1/No Action AMs for these stocks because it will actually affect fishing behavior and the AM applies to all groundfish fishing vessels, not just common pool vessels. At a minimum, fishermen will have to alter their behavior which may impose additional costs; while at a maximum, it could reduce revenues by $15 million if the larger areas are implemented simultaneously. This option cannot be compared to Options 3, 4 or 5 because they address different stocks.

Atlantic halibut:

If adopted, this option would (1) require the use of selective trawl gear in specified trawl halibut AM areas, (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear halibut AM areas, and (2) set a zero possession limit for all vessels.

Trawl vessel restrictions
This sub-option would require the use of selective trawl gears in the area, similar to the windowpane options discussed above. Approximately $5.5 million dollars in estimated gross revenues came from this area with trawl gears in FY 2010.

Table 82 - Gross revenues from VTR trips reported inside the Atlantic halibut trawl restriction area during FY 2010

Port	Gross revenue
Boston, MA	$ 204,404
Gloucester, MA	$ 445,429
New Bedford, MA	$ 4,606,611
Nantucket, MA	$ 122,397
Barnstable, MA	$ 1,589
Point Judith, RI	$ 56,062
Grand Total	$ 5,436,491

Selective gears again substantially change the composition of the catch inside the Atlantic halibut areas. Both VTR reported and observer data collected from tows inside the areas show a much higher proportion of haddock and lower proportion of flatfish relative to traditional trawl gears.

Table 83 - Proportion of total kept catch on observed trips using selective (separator, Ruhle) and traditional (otter) trawl gears inside Atlantic halibut trawl restriction area

	Observer						VTR					
	selective			traditional			selective			traditional		
cod	$	35,711	13.8%	$	364,444	17.5%	$	13,590	23.1%	$	727,859	13.5%
haddock	$	129,036	50.0%	$	784,196	37.6%	$	35,445	60.3%	$	1,738,837	32.3%
flats	$	11,895	4.6%	$	272,928	13.1%	$	3,624	6.2%	$	1,002,378	18.6%
pollock	$	50,824	19.7%	$	116,162	5.6%	$	3,746	6.4%	$	190,192	3.5%
white hake	$	40	0.0%	$	513	0.0%	$	-	0.0%	$	588	0.0%
skates	$	2,306	0.9%	$	25,317	1.2%	$	-	0.0%	$	1,004,889	18.7%
other	$	28,224	10.9%	$	520,649	25.0%	$	29	3.9%	$	-	13.3%
squids	$	-	0.0%	$	85	0.0%	$	2,310	0.0%	$	713,003	0.0%
Grand Total	$	258,036		$	2,084,294		$	58,745		$	5,377,746	

Similar to the windowpane areas, catch rates per observed tow were about 12% higher with the selective gears than with traditional gear for observed tows.

Table 84 - Revenue per tow by two types of trawl gears from tows observed inside Atlantic halibut trawl restriction area.

Trawl net	Revenue per tow		number tows
selective	$	1,518	172
traditional	$	1,353	1541

Fixed gear vessel restrictions:
This option would prohibit fishing with fixed gears. In this case, all of the fishing activities affected by these areas would be displaced, and the costs would be those associated with lower catch rates and/or longer steaming time. Approximately $1 million in estimated revenues came from trips reported fishing inside this area, with Chatham contributing the highest proportion. The bulk of these came from cod.

Table 85 - Gross revenues from VTR trips reported inside the Atlantic halibut fixed gear restriction areas during FY 2010

Port	Gross revenue	
Portland, ME	$	58,196
Harpswell, ME	$	63,342
Gloucester, MA	$	268,373
Chatham, MA	$	629,830
Portsmouth, NH	$	1,878
Seabrook, NH	$	14,005
Grand Total	$	1,039,368

Table 86 - Proportion of total kept catch by species on observed trips inside Atlantic halibut fixed gear restriction areas

	Observer	VTR
cod	$ 16,677	$ 529,950
haddock	$ 4,812	$ 74,247
flats	$ 346	$ 34,350
pollock	$ 2,668	$ 154,034
white hake	$ 5	$ 271
skates	$ 765	$ 20,151
other	$ 4,527	$ -
squids	$ -	$ 226,365
Grand Total	$ 29,798	$ 1,039,368

In summary, implementing the Atlantic halibut AM areas could affect $6.5 million in groundfish revenue. Not all of these revenues are likely to be foregone, as fishermen can choose to fish in the trawl areas with selective gear or could fish in other areas. The delay in implementation of the restriction will give fishermen some time to plan their operations to mitigate the economic impacts of the measure.

This AM will have negative economic impacts compared to the Option 1/No Action AMs for this stock because it will affect fishing behavior of all groundfish fishing vessels, not just common pool vessels. At a minimum, fishermen will have to alter their behavior which may impose additional costs; while at a maximum, it could reduce revenues by $6.5 million if the larger areas are implemented simultaneously. The economic impacts are also likely to be more negative than would occur with Option 3 since a broader range of revenues might be affected – Option 3 would only reduce halibut landings if the AM is triggered. This option cannot be compared to Options 4 or 5 because they address different stocks.

Wolffish:
If adopted, this option would (1) require the use of selective trawl gear in specified trawl wolffish AM areas, and (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear wolffish AM areas.

Trawl vessels:
Almost $4 million dollars in gross revenues were estimated to have been caught inside the proposed trawl restriction area for wolffish. 85% of these came from Gloucester, MA. Like the previously discussed trawl gear restriction areas, this option would require either the use of selective gear, or fishing elsewhere.

Table 87 - Gross revenues from VTR trips reported inside the wolffish trawl gear restriction areas during FY 2010

Port		Gross revenue
Boston, MA	$	102,735
Gloucester, MA	$	3,368,563
Marshfield, MA	$	18,913
New Bedford, MA	$	57,683
Plymouth, MA	$	176,587
Provincetown, MA	$	1,221
Rockport, MA	$	94,100
Portsmouth, NH	$	19,423
Seabrook, NH	$	18,529
Grand Total	$	3,857,756

Selective gears were hardly utilized in this area, with just one reported observed tow and no trips reported in the VTR.

Table 88 - Proportion of total kept catch on observed trips using selective (separator, Rhule) and traditional (otter) trawl gears inside wolffish trawl restriction area.

	Observer		VTR	
	selective	**traditional**	**selective**	**traditional**
cod	$ 3,587	$ 432,268		$ 2,895,946
haddock	$ 205	$ 7,798		$ 41,116
flats	$ -	$ 145,404		$ 794,620
pollock	$ 82	$ 16,149		$ 49,452
white hake	$ -	$ 6		$ 10
skates	$ -	$ 9,187		$ 20,859
other	$ -	$ 14,313		$ 247
squids	$ -	$ 6		$ 55,504
Grand Total	$ 3,874	$ 625,130	$ -	$ 3,857,756

Table 89 - Revenue per tow by two types of trawl gears from tows observed inside Atlantic halibut trawl restriction area.

Trawl net	Revenue per tow	number tows
selective	$ 3,874	1
traditional	$ 1,823	345

Fixed gear vessels:
Fixed gear vessels fishing out of Chatham had estimated revenues of nearly $1 million in FY 2010. These trips would have to occur elsewhere, and while costs may go up slightly these revenues would be made up by fishing in other areas.

Table 90 - Gross revenues from VTR trips reported inside the wolffish fixed gear restriction areas during FY 2010.

Port	Gross revenue
Chatham, MA	$ 987,221
Grand Total	$ 987,221

Table 91 - Proportion of total kept catch by species on observed trips inside wolffish fixed gear restriction areas.

	Observer	VTR
cod	$ 15,171	$ 569,891
haddock	$ 544	$ 31,536
flats	$ 215	$ 1,922
pollock	$ 1,406	$ 90,069
white hake	$ 0	$ -
skates	$ 10,011	$ 147,875
other	$ 4,468	$ -
squids	$ -	$ 145,927
Grand Total	$ 31,816	$ 987,221

In summary, implementing the Atlantic wolffish AM areas could affect $5 million in groundfish revenue. Not all of these revenues are likely to be foregone, as fishermen can choose to fish in the trawl areas with selective gear or could fish in other areas. The delay in implementation of the restriction will give fishermen some time to plan their operations to mitigate the economic impacts of the measure.

This AM will have negative economic impacts compared to the Option 1/No Action AMs for this stock because it will affect fishing behavior of all groundfish fishing vessels, not just common pool vessels. At a minimum, fishermen will have to alter their behavior which may impose additional costs; while at a maximum, it could reduce revenues by $5 million if the larger areas are implemented simultaneously. The economic impacts are also likely to be more negative than would occur with Option 4 since a broader range of revenues might be affected – Option 4 would not result in any change in fishing behavior. This option cannot be compared to Options 3 or 5 because they address different stocks.

Option 3: Atlantic Halibut No Possession AM (Preferred Alternative)

If this measure is adopted if the halibut ACL is exceeded in year 1 then possession would be prohibited in year 3. The maximum revenue losses from this measure would be the value of the ACL for the year when possession would be prohibited. In FY 2012-2014 the groundfish sub-ACL is 36 mt, or just under 80,000 pounds. Halibut is worth over $5/pound, so this would be equivalent to about $400,000 in groundfish revenues. This is larger than the revenue losses under Option 1 because the AM applies to the entire commercial groundfish fishery and not just common pool vessels. It would be less than the revenue losses expected under Option 2 because this AM has no effect on other fishing activity by groundfish fishing vessels. This option cannot be compared to Options 4 or 5 because they address different stocks.

As is the case with all option, this measure would not have any economic impacts on the fishery if the sub-ACL was not exceeded and the AM was not triggered.

Option 4: Atlantic Wolffish No Possession AM (Preferred Alternative)

This AM would result in only minor revenue losses for the groundfish fishery if vessels are allowed to possess one Atlantic wolffish per trip (see section 4.2.3.2). In that case if the sub-ACL is exceeded and the AM is implemented in a following year there would be a maximum potential loss of the revenues from landing the wolffish sub-ACL. These losses would be on the order of $80,000 given the ACL for this stock and an approximate value. These losses would be less than those expected under either Option 1 or Option 2 since this measure is unlikely to affect other groundfish fishing activity. If possession of Atlantic wolffish is not allowed, this measure would not be expected to result in additional losses to the fishery. This option cannot be compared to Options 3 or 5 because they address different stocks.

Option 5: SNE/MA Winter Flounder No Possession AM (Preferred Alternative)

Whether this option, if adopted, would have any economic impacts depends on which management measures are adopted for this stock. If possession of SNE/MA winter flounder is prohibited as would be the case if Option 1 in section 4.2.1.1 is implemented, there would not be any economic impacts from this measure beyond those described in section 7.4.2.1. If Option 2 in section 4.2.1.1 is adopted, and SNE/MA winter flounder can be landed, then this AM could not be adopted and there would not be any economic impacts.

When compared to the Option 1 /No Action economic impacts as a result of the SNE/MA winter flounder AM, this measure would result in fewer possible impacts for common pool vessels. This because the common pool vessels would not be restricted from certain areas if the AM was triggered. Clearly if possession of winter flounder continues to be prohibited, then the adoption of this AM means common pool vessels will not risk any revenue losses as a result of an area-based AM and revenue impacts would be minimal. As such, this option would likely affect revenues less than Option 1 for common pool vessels. For sector vessels there is no difference between this option and Option 1/No Action, since sector activities are not constrained under either option. Since sectors now land the majority of groundfish the differences between this option and Option 1 are minor. This option cannot be compared to Options 2, 3 or 4 because they address different stocks.

7.5 Social Impacts

The need to assess social impacts emanating from federally mandated fishing regulations stems from National Environmental Protection Agency (NEPA) and M-S Act mandates that the social impacts of management measures be evaluated. NEPA requires the evaluation of social and economic impacts in addition to the consideration of environmental impacts. National Standard 8 of the M-S Act demands that “Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of over fishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities” (16 U.S.C. §1851(2)(8)). The analysis that follows provides a context for understanding possible social impacts resulting from the proposed measures in Framework 47.

Amendment 13 identified five social impact factors: regulatory discarding, safety, disruption in daily living, changes in occupational opportunities and community infrastructure, and formation of attitudes. All of these factors can be affected by changes in management measures. Fishermen find regulatory discarding both distasteful and wasteful of valuable fishery resources. Modifications to daily routines can make long-term planning difficult. New gear requirements such as netting and some equipment must be ordered months in advance resulting in changes to daily routines when these modifications cannot be met in a time and cost efficient manner. Further the cost of making such changes may prove to be a burden for some vessel owners. Changes in management measures that limit access to fishing may increase the likelihood of safety risks. Increased risk can result when fishermen spend longer periods at sea in order to minimize steam time to and from fishing grounds, operate with fewer crew, and fish in poor weather conditions. Formation of attitudes refers to the positive or negative feelings or beliefs expressed by members of the communities that will be affected by the Preferred Alternative. The effect of the Preferred Alternative on these factors will be discussed below.

Amendment 13 also the identified primary and secondary port groups that are most affected by changes in groundfish management. The criteria port groups identified for this action are discussed in Section 6.5. It not likely that this action would affect all of these port groups to the same extent. Those port groups that are more dependent on groundfish would likely have more social impacts than those that participate in a range of fisheries. Even among communities with similar dependence on groundfish, there are likely to be different impacts since some measures have localized impacts. The following discussion will also highlight the differences between port groups, where appropriate.

It is important to note that, as in the case with the biological and economic impacts analyses for this framework, social impacts are very difficult to predict. With the implementation of Amendment 16 in FY 2010, many new regulations and new sectors came into place, and the effects of the new regulations interact in a complex manner. While it is widely expected that there will be broad social impacts as a result of recent management actions (such as shifts in effort or increased consolidation), the exact impacts are still unknown. The social impacts to the fishery will be determined, in large part, by the number and makeup of permits that ultimately fish in sectors in upcoming years, as well as by the design and workings of the sectors themselves, which is outside of the Council’s purview. The Council is taking actions to monitor changes in the fishery including holding a "lessons learned" workshop on sector implementation in October 2011, and a more detailed analysis of potential changes in the fishery and possible mitigating measures to enhance fleet diversity are being considered in Amendment 18 to the FMP (in development).

7.5.1 Updates to Status Determination Criteria, Formal rebuilding Programs, and Annual Catch Limits

7.5.1.1 Revised Status Determination Criteria for Winter Flounders and Gulf of Maine Cod

Option 1: No Action

Adoption of the No Action alternative would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be the criteria adopted in Amendment 16. These values were based on the GARM III assessments completed in 2008. Since new benchmarks assessments have been completed for these stocks, and as part of those assessments new SDCs were determined, the use of GARM III values would conflict with M-S Act requirements to use the best available science.

Of the social impact categories defined above, failure to use the best available science would most affect *formation of attitudes* toward management. Many public comments have been received by the Council expressing frustration with the amount of time it takes to incorporate new science and new stock assessments into management measures. The failure to incorporate the most recent winter flounder and GOM cod assessments would only exacerbate that perception.

Option 2: Revised Status Determination Criteria

Adoption of Option 2 would mean the status determination criteria (SDC) for the three winter flounder stocks and GOM cod would be based on the most recent benchmark assessments and would be based on the best available science, consistent with M-S Act requirements.

The use of the best available science in setting status determination criteria for the winter flounders and GOM cod would continue the practice of updating SDCs in the first action that modifies the FMP after a new assessment is completed. While major social impacts are not expected as a result of this action, in comparison to the No Action alternative, it will at least maintain the standard practice and not undermine faith in the process of incorporating assessments into management by using the best available science as early as practicable.

7.5.1.2 Revised GB Yellowtail Flounder Rebuilding Strategy

Option 1: No Action

This option would maintain the rebuilding strategy adopted for this stock in FW 45. The strategy calls for rebuilding by 2016 with a median probability of success. Assessment results from TRAC 2011 indicate that the stock cannot rebuild by 2016 even in the absence of all fishing mortality.

As a result, if this strategy would be continued then fishing mortality would have to be kept as close to zero as possible.

While the setting of a rebuilding strategy in itself does not carry major social impacts aside from affecting attitudes about the process of its development, the ensuing measures that would be designed to achieve the rebuilding goals would. It can be predicted with certainty that any measures that would be designed to keep mortality on GB yellowtail flounder as close to zero as possible would require dramatic reductions in fishing effort, including through closures and/or reduced fishing time, and substantially decreased revenues. Setting a very low fishing mortality level for this stock would have severe social impacts on the groundfish industry as well as the scallop industry, which also catches this stock in its prosecution.

Option 2: Revised rebuilding Strategy for GB Yellowtail Flounder

There are two sub-options in this option, either of which would modify the rebuilding strategy for GB yellowtail flounder. The sub-options are designed to target a fishing mortality rate that will rebuild with a median probability of success by a specific data. In each case, the end date was selected to take into account the possibility that the retrospective pattern observed in the assessment in TRAC 2011 will continue and taking this into account gives a more accurate representation of stock conditions. Either sub-option would rebuild more slowly than Option 1/No Action.

Sub-option A would be expected to rebuild the stock by 2023 with a median probability of success. This estimate is based on fishing at 75 percent of F_{MSY} (the default ABC control rule). Sub-option B would be expected to rebuild the stock by 2032 with a median probability of success. All impacts discussed below would be expected to last as long as the rebuilding period, barring other changes to the FMP or specifications.

This option would have positive social impacts compared to the No Action alternative. It would result in increased effort and landing of this stock when compared to the No Action alternative, which would provide for some increased *occupational opportunities*, although the exact amount of the effort increase is difficult to predict in a mixed-stock fishery. An increase in available GB yellowtail flounder could enable sectors and the common pool to operate longer before reaching their ACE and ACL, which would help create a more stable market and facilitate long-range planning for industry participants. Adoption of these options will also instill a sense of fairness that the rebuilding plans were re-considered in a way that promoted economic growth and incorporated best available science to not be unreasonable restrictive. The magnitude of that effect will be determined by how much the chosen strategy increases available catch over the applicable time frame.

Sub-option B, in particular, may have additional positive social impacts related to attitudes toward management. It is based not only on fishing at the maximum mortality expected to rebuild to SSB_{MSY}, but was also calculated to achieve an average annual increase in SSB of about 10 percent. At meetings of the Council’s Groundfish Committee in the development of this option, some fishery participants have stated that they see an approach based on annual growth as more sensible and more appropriate than the approach used in the past that simply set an end date and a probability of success based on the requirements of the law.

7.5.1.3 U.S./Canada Resource Sharing Understanding TACs

Option 1: No Action

This option would not specify TACs for Eastern GB cod, Eastern GB haddock, or GB yellowtail flounder in the U.S./Canada Management Area for FY 2012. This would be expected to have some positive long-term social impacts if stock rebuilding targets were reached more quickly due decreased effort on the U.S./Canada stocks. A shorter rebuilding time period may lead to increased occupational opportunities as a result of a larger stock size over the long-term.

Option 2: U.S./Canada TACs

This alternative would specify TACs for the U.S./Canada Management Area for FY 2012 for EGB cod, haddock, and GB yellowtail flounder. These TACs would be in effect for the entire fishing year, unless the FY 2011 catch of any stock in the area exceeds its specified TAC. If the TAC in a particular fishing year is exceeded, the TAC for the subsequent fishing year would be reduced by the amount of the overage. In order to minimize any disruption to the fishing industry, NMFS would attempt to make any necessary TAC adjustment in the first quarter of the fishing year.

The proposed hard TACs for the U.S./Canada area would not be expected to have significant social impacts in comparison to the No Action alternative. The TACs for each of the stocks were determined in the same way as has been done in recent years. TACs of the three co-managed species vary from year to year, and while the FW 47 numbers are low compared to the TACs set in recent years, they are roughly proportional to reductions across the entire stock for GB cod, haddock, and yellowtail flounder proposed in other sections of this framework. Although discarding may occur in the area as it does in the rest of the fishery, it is unlikely to be a special issue.

Although the Preferred Alternative would have short-term negative economic impacts in contrast to the No Action Alternative, the impacts should not be significantly different from those in the rest of the fishery in a way that would cause them to have unique social impacts. The long term impacts of the No Action Alternative are more likely to be negative than the Preferred Alternative. Stock rebuilding is likely to have positive social effects, as it will allow effort to increase in the area, and such rebuilding could be jeopardized by the No Action alternative.

7.5.1.4 Administration of Scallop Fishery Sub-ACLs

Option 1: No Action

If Option 1/No Action were implemented there would not be any changes to the way scallop fishery sub-ACLs are administered. Under this option, when a sub-ACL is caught, the AMs that apply to the scallop fishery are implemented. The particular AMs are specified by the Atlantic Sea Scallop FMP. The AMs are implemented without regard to whether other components have caught their allocation and without regard to whether the overall ACL is exceeded.

The No Action alternative would not be expected to have significant social impacts. There is a pervasive attitude that it is unfair that accountability measures be imposed on one section of the fleet when the total ACL for a stock is not harvested (and therefore, no risk is posed to the overall health of a stock beyond what was considered in the ACL-setting process). The No Action alternative would perpetuate that attitude. However, this would be at least partially balanced by industry participants who feel that each portion of the fishery should be accountable for its own actions and not benefit from the failure of another fishery to fully harvest its ACL. The latter attitude conjures notions of fairness between fisheries.

It is important to note that if the AMs are triggered, there could be severe social impacts to the scallop fishery resulting from lost *occupational opportunities*. The No Action alternative increases the possibility that this could occur, but ultimately those impacts would be possible under either option.

Option 2: Changes to Scallop Fishery Sub-ACL Administration

If Option 2 is adopted, then scallop fishery catches of groundfish stocks would continue to be compared to the sub-ACLs, but the AM would only be triggered if the overall ACL was exceeded. As a result, in any given year it is possible that the scallop fishery might exceed its ACL, but AMs would not be triggered if total catches did not exceed the overall ACL.

This option would be expected to have two types of social impacts: *formation of attitudes* because many industry participants perceive it to increase fairness, and a reduced chance of *loss of occupational opportunities* when compared to the No Action alternative.

As mentioned in the discussion of the No Action alternative, there is a pervasive attitude that it is unfair that accountability measures be imposed on one section of the fleet when the total ACL for a stock is not harvested (and therefore, no risk is posed to the overall health of a stock beyond what was considered in the ACL-setting process). Since the purpose of AMs is to prevent overfishing, and this option only implements the scallop fishery AMs when – based on catches exceeding the ACL – overfishing is likely to have occurred, it may be considered more fair than the No Action option. However, there is also a slight risk that some industry participants may feel that it is unfair for the scallop fishery to benefit from the groundfish fishery's potential failure to fully harvest its ACL, which would somewhat offset some of the positive views on fairness.

If the AMs are triggered, there could be severe social impacts to the scallop fishery resulting from lost *occupational opportunities*. This option decreases the possibility that that could occur, in comparison to the No Action alternative, but ultimately those impacts would be possible under either option.

Option 3: In-Season Re-estimation of Scallop Fishery GB Yellowtail Flounder Sub-ACL

This option would require NMFS to re-estimate the expected scallop fishery catch of GB yellowtail flounder by January 15 of the fishing year and increase the sub-ACL to the groundfish fishery if the scallop fishery is not projected to be able to catch its allocation. Initially, the allocation of GB yellowtail flounder to the scallop fishery is based on an estimate of the amount of GB yellowtail flounder the scallop fishery is expected to catch if it harvests all of the available scallops. This initial estimate is based on past fishing activity and projected changes in stock size for both yellowtail flounder and scallops, and includes some amount of uncertainty.

This option, similar to Option 2, would be expected to have positive social impacts in comparison to the No Action alternative. As mentioned previously, there is a pervasive attitude that it is unfair that accountability measures be imposed on one section of the fleet when the total ACL for a stock is not harvested (and therefore, no risk is posed to the overall health of a stock beyond what was considered in the ACL-setting process). In this case, this applies to the potential of triggering AMs in the common pool groundfish fishery and the possibility of sectors being unable to continue fishing because they have reached their allocation of this stock. Since the purpose of AMs is to prevent overfishing, and this option would potentially re-allocate groundfish back to the groundfish fishery in order to defer AMs to the point when – based on catches exceeding the ACL – overfishing is likely to have occurred, it may be considered more fair than the No Action option.

7.5.1.5 Annual Catch Limit Specifications

Option 1: No Action

This option would maintain the specifications (OFLs/ABC/ACLs) for FY 2012 at the same levels as adopted by FW 44 and FW 45. It would also maintain the distribution of the catches to various fisheries sub-components. If this option would be adopted, the specifications would only be identified for FY 2012 for all stocks except pollock, and not later years. The specifications would not reflect the recent assessments of the three winter flounder stocks, GB yellowtail flounder, and GOM cod.

The No Action alternative for specifications, if adopted, would entail the failure by the Council to adopt ACLs for the fishery based on the best available science, as well as a lack of TACs for the U.S./Canada area. A description of the social impacts of using ACLs in the management of the groundfish fishery can be found in Amendment 16.

Of the social impact categories defined above, failure to use the best available science would most affect *formation of attitudes* toward management. Many public comments have been received by the Council expressing frustration with the amount of time it takes to incorporate new science and new stock assessments into management measures. The failure to adopt ACLs based on the most recent assessments and analyses would only exacerbate that perception.

Because the ACLs are simply caps on the amount of catch that can occur for each stock in the fishery, maintaining the ACL numbers from FW 44 and FW 45 itself does not have major social impacts. There would therefore likely be few social impacts of adopting No Action. Catches are limited, they may be viewed as conservative limits, and the complexity of setting the limits may deter participation in the management process. The relatively minor differences in catch levels are not likely to substantially alter the perception of the management program.

Option 2: Revised Annual Catch Limit Specifications

Option 2 would adopt new ABCs for the three winter flounder stocks, GB yellowtail flounder, GOM cod, and the three stocks assessed with a survey index. The ABCs for other stocks are the same as in Option 1/No Action and so these impacts are not summarized again.

This measure includes the identification of ACLs based on the best available science as required by the M-S Act and as implemented by Amendment 16. It also incorporates adoption of the TACs for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder that are applicable to the U.S./Canada Resource Sharing Understanding.

Implementation of ACLs as required by the Magnuson-Stevens Act may have social impacts that are difficult to define. Since it cannot be determined whether the use of ACLs will change effort levels or allocation of the resource, the most likely type of impact is a change in the formation of attitudes toward the management process. The standardization of a process to determine fishing levels may lend a sense of legitimacy to fisheries management in the eyes of the public. However, the process for setting ACLs is quite complicated and technical, and some would-be public participants could be deterred from engaging in management forums.

Compared to the No Action alternative, some of the ACLs being adopted are more permissive than those set in Frameworks 44 and 45, while others are more restrictive. The adoption of the more restrictive ACLs may lead to concerns that the fishery is being managed in an overly conservative manner. This could affect attitudes towards the management program since it will be viewed as limiting occupational opportunities unnecessarily. However, the more permissive ACLs proposed in this option are likely to have the opposite effect: they can increase *occupational opportunities* and reduce *regulatory discarding* that may occur if trip limits are imposed on stocks with low ACLs. These effects are expected to be minor. Because this is a mixed-stock fishery, an increase in ACLs for certain stocks, such as pollock, is tempered by the fact that catches may still be limited by bycatch or concurrent catch of other species managed in the FMP.

Because the ACLs are simply caps on the amount of catch that can occur for each stock in the fishery, the adoption of ACLs numbers itself does not have major social impacts. Rather, low ACLs drive conservative management strategies, and the methods for reducing effort or allocating the ACL are the largest contributors to impacts of a social nature. The sector and effort control systems currently in place were adopted in Amendment 16 and updated in subsequent frameworks, and impacts of each measure were described in those documents. Impacts of alternatives that would change allocations and management measures in FW 47 are analyzed in this document.

However, in light of the discussion above, there is likely to be little difference between the social impacts of the Preferred Alternative and No Action. Under both circumstances, catches are limited, they may be viewed as conservative limits, and the complexity may deter participation in the management process. The relatively minor differences in catch levels are not likely to alter the perception of the management program.

7.5.2 Commercial and Recreational Fishery Measures

7.5.2.1 Management Measures for SNE/MA Winter Flounder

Option 1: No Action

Landings of SNE/MA winter flounder would continue to be prohibited under this option. Because landing is prohibited there would likely be little groundfish fishing for this stock or other stocks that are caught with SNE/MA winter flounder. The prohibition on landing this stock has been in effect for all of 2010 and eight months of 2009. Catches were well below the groundfish sub-ACL in FY 2010, with only 9 percent of the sub-ACL caught. As noted in the biological impacts section, this measure would indirectly affect the ability to assess this stock by reducing the number of fish that can be obtained for biological sampling by port agents. Over time this would result in a decreased understanding of changes in the stock and would increase assessment uncertainty.

This option, as a continuation of the status quo, would be unlikely to have significant social impacts. When it was adopted, it was seen as a way to allow sectors to continue to operate without binding them to very low quotas of this stock. Because of that perception, it was received positively by the industry. If the stock size increases so that it may be landed and treated in a manner similar to other groundfish stocks, it seems that *formation of attitudes* could be negatively impacted if it is perceived as unfair or unjustifiable in regard to the treatment of other stocks. It also leads to *discards* of the stock, which is viewed negatively by many fishermen. Also, any increase in uncertainty could negatively affect the other social impact categories. Uncertainty in assessments can lead to lower allowed catches, which could reduce *occupational opportunities* and negative *attitudes* about the assessment and management processes.

Option 2: Allocate SNE/MA winter flounder to the fishery

If adopted, this option would allow the landing of SNE/MA winter flounder by both common pool and sector vessels. Catches would still be limited to the ACL that was established and in particular the groundfish fishery would be limited to its sub-ACL. Because landing would be allowed, however, it would be expected that catches would increase when compared to Option 1/No Action and would probably exceed the 9 percent of the sub-ACL caught in FY 2010. An indirect impact of this option is that allowing landing of this stock will provide increased opportunities for biological sampling of the catch, and therefore increase certainty in future assessments of this stock.

This option overall would be expected to have positive social impacts in comparison to the No Action alternative, if the stock size were sufficient in order to allow landings without compromising the ability of sector participants to harvest the ACL of other allocated stocks. Assuming that were the case, it should be perceived as fair to treat the stock like most of the other regulated groundfish stocks. It would also provide for increased *occupational opportunities* if the overall landings were increased, and if sector fishermen were able to sell the SNE/MA winter flounder they catch. However, is this measure were to endanger sectors' ability to harvest the ACL of other stocks in the mixed-stock fishery, and as a result sector participants had to stop fishing because the allocation, there would be a substantial risk of decreased *occupational opportunities*.

This option could also improve attitudes about management and about the scientific process in fisheries management if it were to lead to increased certainty in future assessments for this stock. A better understanding of the stock condition could lead to more regularity in its management, narrower interannual fluctuations in allowable catch levels, and an increased ability to plan fishing and business opportunities.

7.5.2.2 Scallop Catch of Yellowtail Flounder in GB Access Areas – Modification of Restrictions

Option 1: No Action

If adopted, scallop fishery catches of GB and SNE/MA yellowtail flounder in the CAI, CAII, and NLCA access areas would continue to be limited to 10 percent of the ACL of the relevant stock. This would not limit the potential total catches of yellowtail flounder by the scallop fishery but it would limit the amount of the sub-ACL that is taken within closed areas. Because this measure could constrain scallop fishing effort within the access areas, it may also reduce catches of other groundfish stocks within these areas.

This option would not be expected to have significant social impacts, as it continues the status quo in the access areas. Since the overall cap of yellowtail flounder caught by the scallop fishery is set with a hard limit, it is commonly viewed as unfair, or "micro-managing", to limit the portion of that catch that can be taken in the access areas.

Option 2: Eliminate cap on yellowtail flounder caught in the GB access areas

This option would remove the restriction on the amount of the scallop fishery sub-ACL for either SNE/MA or GB yellowtail flounder that can be caught the CAI, CAII, or NLCA access areas. This measure could result in more of the catch of these two stocks being caught in a relatively small part of the stock area, and possibly during a narrowly defined part of the year since the access areas are not open year-round at present.

In general this option would have positive social impacts in comparison to the No Action alternative, as it is widely viewed by industry participants as fair to reduce effort controls on fisheries that are capped by a hard limit on allowable catch. The biological impacts of these localized catches are uncertain, and to some extent the social impacts may partially depend on the realized biological impacts. As discussed in the biological impacts section, this measure has the potential to increase or decrease the overall rebuilding rate for these stocks. If rebuilding is compromised, *occupational opportunities* for participants who fish for and gain income from these fish may be reduced. However, if spawning fish are avoided as a result of this option and rebuilding occurs faster than it otherwise would, *occupational opportunities* will be increased.

7.5.2.3 Atlantic Wolffish Landing Limit

Option 1: No Action

If this option is adopted, possession of Atlantic wolffish would continue to be prohibited. Both recreational and commercial fishermen would be required to return fish to the sea with a minimum of harm. This measure reduces the incentive to target Atlantic wolffish, reducing fishing mortality, but this species is not typically caught in large enough quantities that active targeting is common. Those fish that are incidentally caught would also not be retained and some would be expected to survive.

Overall, this option would not be expected to have significant social impacts, as it maintains the status quo for this stock. The zero-possession rule is one of the major factors that led to a determination that Atlantic wolffish should not be listed under the Endangered Species Act, and this compromise has been viewed positively by many stakeholders from different backgrounds.

One indirect impact of this measure is that, compared to Option 2, it reduces the number of wolffish that are landed. This means little fishery-dependent data is available to monitor the condition of this stock, making future assessments more uncertain. Any increase in uncertainty could negatively affect some social impact categories. Uncertainty in assessments can lead to lower allowed catches, which could reduce *occupational opportunities* and negative *attitudes* about the assessment and management processes.

Option 2: Revised Atlantic Wolffish Possession Limit

If this option is adopted, commercial fishing vessels would be allowed to retain one Atlantic wolffish. Recreational fishing vessels would not be allowed to retain any Atlantic wolffish. This measure, when compared to Option 1/No Action, would be expected to lead to a slight increase in Atlantic wolffish fishing mortality. However, any impacts on fishing mortality are likely to be slight and probably undetectable.

This option would not be expected to have major social impacts. While commercial fishing vessels would be allowed to land one wolffish per fishing trip, it is unlikely that any major financial benefit would be achieved. It is possible that *safety* would be slightly increased, since anecdotal reports suggest that wolffish are dangerous to handle delicately, and if a fishing operator were to catch one wolffish they could opt to kill it and land it, rather than trying to return it to sea alive. Also, there is a slight possibility this measure could be perceived as unfair, since only commercial fishing vessels would be allowed to retain a wolffish and recreational vessels would not.

In contrast to Option 1/No Action, more fish would be available for biological sampling and the ability to monitor the stock would be improved. This could also improve attitudes about management and about the scientific process in fisheries management if it were to lead to increased certainty in future assessments for this stock. A better understanding of this data-poor stock condition could lead to more closely tailored regulations and an increased ability to plan fishing and business opportunities.

7.5.2.4 Common Pool Restricted Gear Areas

Option 1: No Action

If this option were to be adopted, the common pool restricted gear areas (RGAs) adopted in Amendment 16 would remain in effect. These areas and the applicable regulations are described in section 4.2.4.1. The RGAs were implemented primarily to reduce catches of several flatfish species by requiring the use of gear that typically is not effective at catching them. The areas were positioned to reduce catches of SNE/MA winter flounder, SNE/MA yellowtail flounder, SNE/MAB windowpane flounder, witch flounder, and plaice. When compared to Option 2, this measure would be expected to reduce fishing mortality for several groundfish stocks even if compliance is weak.

Overall, this option would not be expected to have significant social impacts, as it maintains the status quo. However, the low compliance rate may raise questions of fairness between fishery participants who abide by the restricted areas and those who do not. While reduced fishing mortality on several vulnerable flatfish stocks is overall seen as desirable, it is also widely viewed by industry participants as fair to reduce effort controls on fisheries that are capped by a hard limit on allowable catch. The perception is that the hard limits protect the stock status, and that effort controls should be removed so that fishing vessel operators can make business plans that best suit them. However, the imposition of the trimester TAC accountability measures mean that if the common pool catches their allocation of a stock, the fishery will shut down, so fears of a derby fishery persist.

Option 2: Removal of Common Pool Restricted Gear Areas

This option would remove the restricted gear area provisions adopted by Amendment 16 and described in section 4.2.4.1. When compared to Option 1/No Action this measure would be expected to lead to increased fishing activity by common pool vessels that might target SNE/MA winter flounder, SNE/MA yellowtail flounder, and several other stocks. As a result it is reasonable to expect that common pool catches would increase from those in FY 2010 and 2011.

This option, compared to the No Action alternative, would be expected to have positive social impacts unless the common pool allocation was reached before the end of the fishing year. The ability of fishing vessel operators to choose the times and areas in which they fish would increase business planning, *occupational opportunities*, and *safety*. However, beginning in FY 2012 the common pool AMs will include trimester TACs for most species, allowing strict control of catches in-season. This could have the result of a common pool fishery shut-down during the year. A fishery shut-down would negatively impact each of the social impact categories by eliminating fishing opportunities entirely for the duration of the trimester in which the TAC was reached.

7.5.2.5 Accountability Measures

Option 1: No Action

If this option is adopted the primary AM for ocean pout, both windowpane flounder stocks, Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder would be the trimester “hard” TAC system that applies to common pool vessels beginning in FY 2012. This measure may not be an effective control on fishing mortality for these stocks for several reasons. First, the AM applies only to common pool fishing vessels and does not constrain vessels fishing in sectors. As a result only part of the catches will be affected by the AMs.

Overall, this option would not be expected to have significant social impacts, as it maintains the status quo as adopted in Amendment 16. However, it has the potential to create perceptions of unfairness since one portion of the fishery is effectively penalized for an overage by any other portion.

Option 2: Area-Based Accountability Measures for Atlantic Halibut, Ocean Pout, Windowpane Flounder, and Atlantic Wolffish

This AM would impose area-based restrictions if the total ACL for any of these stocks is exceeded. The restrictions are designed to apply at certain times and in certain areas. If an AM is triggered either selective gear is required in an area or the area is closed to fishing with particular gear. Details are provided in section 4.2.5.2. It is important to note that this AM affects all groundfish fishing activity, sector and common pool, unlike Option 1/No Action.

There are some minor positive social impacts associated with this option, in comparison to the No Action alternative. Because the proposed closures would create effective AMs for both the sector and common pool components of the fishery, it could help to promote perceptions of equity and fairness among the two fleets.

Despite that potential positive impact, if the AMs are triggered this option could be expected to have overall negative social impacts. Social impacts of closed areas may tend to be more far-reaching in nature than social impacts from other management measures that are more administrative in nature, although the impacts are not as great as those that would result from very low catch limits or reductions in days at sea.

Area closures tend to have the most significant impacts on disruption in daily living and changes in occupational opportunities and community infrastructure. Area-based restrictions such as these, compared to the No Action alternative, are likely to cause effort to be shifted to other areas, which could change opportunities and infrastructure in homeports and ports of landing. Reductions in groundfish fishing opportunities in this area compromise vessels' flexibility and can have direct impacts on fishing activity within a port, consequently impacting the shoreside facilities that are dependent on the affected vessels. If vessels in certain areas choose to relocate or not to operate as a result of these closures, social impacts associated with economic loss could occur including increased uncertainty and instability in the fishery and/or community, problems finding and keeping crew members on a year-round basis, social impacts related to family and business financial problems, overall increased stress at the individual, family, and community level, and reductions in perceptions about job satisfaction. Given the limited nature of the potential closures, however, the loss of business is expected to be minor and therefore these effects will not be substantial. Note that the most significantly impacted communities will be those that are geographically proximate to the area or that serve as the homeport for vessels that fish there.

Option 3: Atlantic Halibut No Possession AM

If adopted this measure would prohibit landing Atlantic halibut if the sub-ACL would be exceeded. On the surface this measure appears similar to the Option 1/No Action alternative which allows for adjustments to the Atlantic halibut trip limit when a percentage of the TAC/ACL is projected to be caught. But unlike the No Action alternative, this measure would prohibit possession by both sector and common pool vessels. Since a greater percentage of the catch would be subject to this measure the control of fishing mortality would be more effective than under the No Action alternative. When compared to Option 2, this measure would likely be less effective at controlling fishing mortality.

This measure would be expected to have overall similar, but slightly positive social impacts when compared to the No Action alternative. Because the proposed prohibition on landing would apply to both the sector and common pool components of the fishery, it could help to promote perceptions of equity and fairness among the two fleets. The more effective control of fishing mortality would also lead to long-term increased *occupational opportunities* as the stock can rebuild more quickly.

Option 4: Atlantic Wolffish No Possession AM

If adopted, this measure would prohibit landing Atlantic wolffish if the sub-ACL would be exceeded. Unlike the No Action alternative, this measure would prohibit possession by both sector and common pool vessels at all times as a proactive approach to an AM. When compared to Option 2, this measure would likely be less effective. Unlike Option 2, which restricts fishing activity in certain areas if the ACL is exceeded, this measure does not restrict activity and similar amounts of wolffish would be expected to be caught both before and after the AM is implemented. The effectiveness of this measure in reducing mortality would be due to the portion of the discarded catch that survives once the AM is implemented.

This option is not expected to have significant social impacts, in comparison to the No Action alternative. Because the proposed prohibition on landing would apply to both the sector and common pool components of the fishery, it could help to promote perceptions of equity and fairness among the two fleets. The more effective control of fishing mortality would also lead to long-term increased occupational opportunities as the stock can rebuild more quickly. As is the case with the No Action alternative on the Atlantic wolffish landing limit measure, this measure would reduce the number of wolffish that are landed, meaning that little fishery-dependent data is available to monitor the condition of this stock, making future assessments more uncertain. Any increase in uncertainty could negatively affect some social impact categories. Uncertainty in assessments can lead to lower allowed catches, which could reduce *occupational opportunities* and negative *attitudes* about the assessment and management processes.

When compared to Option 2, this measure might have positive social impacts because there is no risk that fishing in any area will be restricted if the AM is exceeded, as is the case if Option 2 is adopted. This could provide additional *occupational opportunities* when compared to Option 2.

Option 5: SNE/MA Winter Flounder No Possession AM

This option would define a prohibition on the possession of SNE/MA winter flounder as a proactive AM. This option is not expected to have significant social impacts, in comparison to the No Action alternative. Because the proposed prohibition on landing would apply to both the sector and common pool components of the fishery, it could help to promote perceptions of equity and fairness among the two fleets. The more effective control of fishing mortality would also lead to long-term increased occupational opportunities as the stock can rebuild more quickly. None of the other AM options address SNE/MA winter flounder so this option cannot be compared to them.

7.6 Cumulative Effects Analysis

7.6.1 Introduction

A cumulative effects assessment (CEA) is a required part of an EIS or EA according to the Council on Environmental Quality (CEQ) (40 CFR part 1508.7) and NOAA's agency policy and procedures for NEPA, found in NOAA Administrative Order 216-6. The purpose of the CEA is to integrate into the impact analyses, the combined effects of many actions over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective but rather, the intent is to focus on those effects that are truly meaningful. This section serves to examine the potential direct and indirect effects of the alternatives in Framework 47 together with past, present, and reasonably foreseeable future actions that affect the groundfish environment. It should also be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in nature.

<u>Valued Ecosystem Components (VEC)</u>
As noted in Section 6.0 (Description of the Affected Environment), the VECs that exist within the groundfish fishery are identified and the basis for their selection is established. Those VECs were identified as follows:

1. Regulated groundfish stocks (target and non-target);
2. Non-groundfish species (incidental catch and bycatch);
3. Endangered and other protected species;
4. Habitat, including non-fishing effects; and
5. Human Communities (includes economic and social effects on the fishery and fishing communities).

<u>Temporal Scope of the VECs</u>
While the effects of historical fisheries are considered, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. 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, this analysis examines the period between implementation of this amendment (May 1, 2012) and 2017.

<u>Geographic Scope of the VECs</u>
The geographic scope of the analysis of impacts to regulated groundfish stocks, non-groundfish species and habitat for this action is the total range of these VECs in the Western Atlantic Ocean, as described in the Affected Environment section of the document (Section 6.0). However, the analyses of impacts presented in this amendment focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources

occurs. For endangered and protected species, the geographic range is the total range of each species (Section 6.4).

Because the potential exists for far-reaching sociological or economic impacts on U.S. citizens who may not be directly involved in fishing for the managed resources, the overall geographic scope for human communities is defined as all U.S. human communities. Limitations on the availability of information needed to measure sociological and economic impacts at such a broad level necessitate the delineation of core boundaries for the human communities. Therefore, the geographic range for the human environment is defined as those primary and secondary ports bordering the range of the groundfish fishery (Section 6.5) from the U.S.-Canada border to, and including, North Carolina.

Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the baseline condition consists of the present condition of the VECs plus the combined effects of past, present and reasonably foreseeable future actions); PLUS (3) impacts from the Preferred Alternative and other alternatives.

A description of past, present and reasonably foreseeable future actions is presented immediately below in

Table 92. The baseline conditions of the resources and human community are subsequently summarized although it is important to note that beyond the stocks managed under this FMP and protected species, quantitative metrics for the baseline conditions are not available. Finally, a brief summary of the impacts from the alternatives contained in this framework is included. The culmination of all these factors is considered when making the cumulative effects assessment.

7.6.2 Past, Present and Reasonably Foreseeable Future Actions

Table 92 summarizes the combined effects of other past, present and reasonably foreseeable future actions that affect the VECs, i.e., actions other than those alternatives under development in this document.

Note that most of the actions affecting this framework and considered in Table 92 come from fishery-related activities (e.g., federal fishery management actions). As expected, these activities have fairly straightforward effects on environmental conditions, and were, are, or will be taken, in large part, to improve those conditions. The reason for this is the statutory basis for federal fisheries management: the reauthorized Magnuson-Stevens Act. That legislation was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically, the act stipulates that management comply with a set of National Standards that collectively serve to optimize the conditions of the human environment. Under this regulatory regime, the cumulative impacts of past, present, and future Federal fishery management actions on the VECs should be expected to result in positive long-term outcomes. Nevertheless, these actions are often associated with offsetting impacts. For example, constraining fishing effort frequently results in negative short-term socio-economic impacts for fishery participants. However, these impacts are usually necessary to bring about long-term sustainability of a given resource and as such should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the managed resource.

Bycatch is one of the primary factors affecting Atlantic sturgeon cited in NMFS' listing for the five Distinct Population Segments (DPSs) of Atlantic sturgeon. Previous analyses concluded that to remain stable or grow, populations of Atlantic sturgeon can sustain only very low anthropogenic sources of mortality (Kahnle *et al*. 2007). Therefore, reductions in bycatch mortality will most likely be required in order to recover Atlantic sturgeon. Current estimates for DPS are noted in Section 6.4. Although NMFS does not have information necessary to determine the sex or spawning condition of Atlantic sturgeon encountered by the groundfish fishery, these encounters may include both males and females and fish that may or may not spawn during that year. Therefore, encounters of Atlantic sturgeon by the groundfish fishery are expected to be a subset of the entire population, as opposed to being comprised exclusively of the smaller annual spawning population.

On February 6, 2012, NMFS issued two final rules (77 FR 5880-5912*;* 77 FR 5914-5982*)* listing five DPSs of Atlantic sturgeon as threatened or endangered. Four DPSs (New York Bight, Chesapeake Bay, Carolina and South Atlantic) are listed as endangered and one DPS (Gulf of Maine) is listed as threatened. The effective date of the listing is April 6, 2012.

NMFS has reinitiated consultation on the 10 fisheries, including the NE Multispecies FMP. NMFS has determined that allowing these fisheries to continue during the reinitiation period will not violate ESA sections 7(a)(2) and 7(d). Preliminary analysis indicates that multiple

DPSs of Atlantic sturgeon may be affected by the continued operation of these fisheries. During the reinitiation period, NMFS will also review information on listed whales and sea turtles that has become available since consultations on these FMPs were last completed and will incorporate new information and analysis into the biological opinions as appropriate. The ESA and the Section 7 regulations (50 CFR § 402.14) require that formal consultation be concluded within 90 calendar days of initiation, and that a biological opinion be completed within 45 days after the conclusion of formal consultation. NMFS anticipates completing these consultations within that period.

NMFS has determined that the continued operation of the NE Multispecies FMP during the reinitiation period is not likely to jeopardize the continued existence of any Atlantic sturgeon DPS. This is based on the short time period encompassed by the reinitiation period and consequently, the scale of any interactions with Atlantic sturgeon that may occur during this period.

NMFS will implement any appropriate measures outlined in the Biological Opinion to mitigate harm to Atlantic sturgeon. Further, the encounter rates and mortalities for Atlantic sturgeon that have been calculated as part of the preliminary analysis of NEFOP data (as discussed in Sec 6.4) include encounters and mortalities by all fisheries utilizing large-mesh sink gillnet and otter trawl gear, including the spiny dogfish, and monkfish fisheries. Thus, it is likely that rates of encounters and mortalities by the groundfish fishery would be lower than those estimates. Therefore, impacts resulting from the proposed action are not likely to be significant.

Non-fishing activities were also considered when determining the combined effects from past, present and reasonably foreseeable future actions. Activities that have meaningful effects on the VECs include the introduction of chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. These activities pose a risk to the all of the identified VECs in the long term. Human induced non-fishing activities that affect the VECs under consideration in this document are those that tend to be concentrated in near shore areas. Examples of these activities include, but are not limited to agriculture, port maintenance, beach nourishment, coastal development, marine transportation, marine mining, dredging and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these VECs to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities.

Table 92 – Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 47

VEC	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Regulated Groundfish Stocks	**Mixed** Combined effects of past actions have decreased effort, improved habitat protection, and implemented rebuilding plans when necessary. However, some stocks remain overfished	**Positive** Current regulations continue to manage for sustainable stocks	**Positive** Future actions are anticipated to continue rebuilding and strive to maintain sustainable stocks	**Short-term Negative** Several stocks are currently overfished, have overfishing occurring, or both **Long-Term Positive** Stocks are being managed to attain rebuilt status
Non-Groundfish Species	**Positive** Combined effects of past actions have decreased effort and improved habitat protection	**Positive** Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species	**Positive** Future actions are anticipated to continue rebuilding and target healthy stocks, thus limiting the take of discards/bycatch	**Positive** Continued management of directed stocks will also control incidental catch/bycatch
Endangered and Other Protected Species	**Positive** Combined effects of past fishery actions have reduced effort and thus interactions with protected resources	**Positive** Current regulations continue to control effort, thus reducing opportunities for interactions	**Mixed** Future regulations will likely control effort and thus protected species interactions, but as stocks improve, effort will likely increase, possibly increasing interactions	**Positive** Continued effort controls along with past regulations will likely help stabilize protected species interactions
Habitat	**Mixed** Combined effects of effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities	**Mixed** Continued fisheries management will likely control effort and thus fishery related habitat impacts but fishery and non-fishery related activities will continue to reduce habitat quality
Human Communities	**Mixed** Fishery resources have supported profitable industries and communities but increasing effort and catch limit controls have curtailed fishing opportunities	**Mixed** Fishery resources continue to support communities but increasing effort and catch limit controls combined with non-fishing impacts such as high fuel costs have had a negative economic impact	**Short-term Negative** As effort controls are maintained or strengthened, economic impacts will be negative **Long-term Positive** As stocks improve, effort will likely increase which would have a positive impact	**Short-term Negative** Lower revenues would likely continue until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies

<u>Impact Definitions:</u>
-Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species: positive=actions that increase stock size and negative=actions that decrease stock size
-Habitat: positive=actions that improve or reduce disturbance of habitat and negative=actions that degrade or increase disturbance of habitat
-Human Communities: positive=actions that increase revenue and well being of fishermen and/or associated businesses and negative=actions that decrease revenue and well being of fishermen and/or associated businesses

7.6.3 Baseline Conditions for Resources and Human Communities

For the purposes of a cumulative effects assessment, the baseline conditions for resources and human communities is considered the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions. The following table (Table 93) summarizes the added effects of the condition of the VECs (i.e., status/trends from Section 7.6.2) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 92 above). The resulting CEA baseline for each VEC is exhibited in the last column (shaded). In general, straightforward quantitative metrics of the baseline conditions are only available for the managed resources, non-target species, and protected resources. The conditions of the habitat and human communities VECs are complex and varied. As such, the reader should refer to the characterizations given in Sections 6.1 and 6.5, respectively. As mentioned above, this cumulative effects baseline is then used to assess cumulative effects of the proposed management actions below in Table 93.

Impact Definitions for Table 93 below:

Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species	Positive = actions that increase stock size Negative = actions that decrease stock size
Habitat	Positive = actions that improve or reduce disturbance of habitat Negative = actions that degrade or increase disturbance of habitat
Human Communities	Positive = actions that increase revenue and well being of fishermen and/or associated businesses Negative = actions that decrease revenue and well being of fishermen and/or associated businesses
All VECs	Mixed = both positive and negative

Table 93 – Cumulative effects assessment baseline conditions of the VECs

Regulated Groundfish Stocks	**Georges Bank Cod**	Overfished and overfishing is occurring.	**Negative** – short term: Several stocks are currently overfished, have overfishing occurring, or both; **Positive** – long term: Stocks are being managed to attain rebuilt status	**Negative** – short term: Overharvesting in the past contributed to several stocks being overfished or where overfishing is occurring; **Positive –** long term: Regulatory actions taken over time have reduced fishing effort and with the addition of Amendment 16, stocks are expected to rebuild in the future
	Gulf of Maine Cod	Not overfished but overfishing is occurring.		
	Georges Bank Haddock	Not overfished and overfishing is not occurring.		
	Gulf of Maine Haddock	Not overfished and overfishing is not occurring.		
	Georges Bank Yellowtail	Overfished and overfishing is occurring.		
	SNE/Mid-Atlantic Yellowtail	Overfished and overfishing is occurring.		
	Cape Cod-Gulf of Maine Yellowtail	Overfished and overfishing is occurring.		
	American Plaice	Not overfished and overfishing is not occurring.		
	Witch Flounder	Overfished and overfishing is occurring.		
	Georges Bank Winter Flounder	Not overfished and overfishing is not occurring.		
	Gulf of Maine Winter Flounder	Not possible to determine overfished status and overfishing does not appear to be occurring.		
	SNE/Mid-Atlantic Winter Flounder	Overfished and overfishing is not occurring.		
	Acadian Redfish	Not overfished and overfishing is not occurring.		
	White Hake	Overfished and overfishing is occurring.		
	Pollock	Not overfished and overfishing is not occurring.		
	Northern Windowpane	Overfished and overfishing is occurring.		
	Southern Windowpane	Not overfished but overfishing is occurring.		
	Ocean Pout	Overfished but overfishing is not occurring.		
	Atlantic Halibut	Overfished but overfishing is not occurring.		

Table 93 cont'd.

<table>
<tr><th colspan="2">VEC</th><th>Status/Trends</th><th>Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 92)</th><th>Combined CEA Baseline Conditions</th></tr>
<tr><td rowspan="3">Non-groundfish Species (principal species listed in section Error! Reference source not found.)</td><td>Monkfish</td><td>Not overfished and overfishing is not occurring.</td><td rowspan="3">Positive – Continued management of directed stocks will also control incidental catch/bycatch.</td><td rowspan="3">Positive – Although prior groundfish management measures likely contributed to redirecting effort onto non-groundfish species, as groundfish rebuild this pressure should lessen and all of these species are also managed through their own FMP.</td></tr>
<tr><td>Dogfish</td><td>Not overfished and overfishing is not occurring.</td></tr>
<tr><td>Skates</td><td>Thorny skate is overfished but overfishing is not occurring. All other skate species are not overfished and overfishing is not occurring.</td></tr>
<tr><td colspan="2">Habitat</td><td>Fishing impacts are complex and variable and typically adverse (see section 6.1.4); Non-fishing activities had historically negative but site-specific effects on habitat quality.</td><td>Mixed – Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities. An omnibus amendment to the FMP with mitigating habitat measures is under development.</td><td>Mixed - reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as global warming, could increase and have a negative impact.</td></tr>
<tr><td rowspan="4">Protected Resources</td><td>Sea Turtles</td><td>Leatherback, Kemp's ridley and green sea turtles are classified as endangered under the ESA and loggerhead sea turtles are classified as threatened.</td><td rowspan="4">Positive – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact</td><td rowspan="4">Positive – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.</td></tr>
<tr><td>Large Cetaceans</td><td>Of the baleen whales (right, humpback, fin, blue, sei and minke whales) and sperm whales, all are protected under the MSA and with the exception of minke whales, all are listed as endangered under the ESA.</td></tr>
<tr><td>Small Cetaceans</td><td>Pilot whales, dolphins and harbor porpoise are all protected under the MSA. The most recent stock assessment for harbor porpoise shows that takes are increasing and nearing PBR.</td></tr>
<tr><td>Pinnipeds</td><td>ESA classification: Endangered, number of nesting females below sustainable level; taken by Loligo trawl</td></tr>
</table>

Table 93 cont'd.

VEC	Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 92)	Combined CEA Baseline Conditions
Human Communities	Complex and variable (see Section 6.5). Although there are exceptions, generally groundfish landings have decreased for most New England states since 2001. Declines in groundfish revenues since 2001 have also generally occurred.	**Negative** – Although future sustainable resources should support viable communities and economies, continued effort reductions over the past several years have had negative impacts on communities	**Negative –** short term: lower revenues would continue until stocks are sustainable **Positive** – long term: sustainable resources should support viable communities and economies

7.6.4 Summary Effects of Framework 47 Actions

The alternatives contained in Framework 47 can be divided into two broad categories. First, this action adjusts status determination criteria for some stocks within the management complex and sets catch levels for the complex for fishing years 2012-2014. Second, the action adopts administrative measures related to sector management, including measures to control mortality and enhance operations of the commercial fleet.

The adjustments in specifications for FY 2012-FY 2014 complete actions called for by Amendment 16 in order to fulfill M-S Act requirements and update management goals using the best available science. Amendment 16 defined the fishing mortality targets needed to rebuild groundfish stocks and end overfishing, and adopted a complex suite of measures designed to achieve these mortality objectives. This action builds upon the specifications adopted in Frameworks 44, 45, and 46 that used available data to translate those mortality targets into specific amounts of fish. These quantities must be defined in order to implement the ACLs and AMs called for in the amendment. The ACLs identified are thus consistent with the amendment. Other elements of this process include setting the status determination criteria for the winter flounder stocks and GOM cod, revising the GB yellowtail flounder rebuilding strategy, changes to scallop fishery sub-ACLs, and specifying U.S./Canada TACs. In general, the adoption of all of these specifications will benefit groundfish stocks because collectively they make it more likely that mortality targets are reasonable and will not be exceeded. They are not likely to impact non-groundfish stocks, protected species, or habitat to any great extent when compared to the No Action alternative, since these proposed specifications differ only slightly from the No Action alternative. In some cases the specifications will have negative impacts on communities in the short-term as they further reduce expected landings and revenues, while for others (namely the revised ACLs for pollock and GB yellowtail flounder) the reverse impacts on communities will occur. In the long-term however, communities should ultimately benefit from rebuilding progress.

The second broad category of measures adopted by this action is measures that affect the prosecution of the commercial fishery. Modification of the measures for scallop catch of yellowtail flounder in GB access areas will help the scallop fishery achieve OY. Removal of common pool gear restricted areas is designed to help the common pool fishery be profitable and provide flexibility while not posing a risk to groundfish stock status. Area-based accountability measures for ocean pout and windowpane flounder, and no possession accountability measures for Atlantic halibut and Atlantic wolffish, are designed to bring the FMP into compliance with the law by preventing ACLs from being exceeded. These measures are expected to have positive or neutral benefits for groundfish stocks, since if catches remain at or below the ACL it is more likely that mortality targets will be met and rebuilding efforts will be successful. None of these measures are expected to appreciably affect non-groundfish stocks, protected species, or EFH.

7.6.5 Cumulative Effects Summary

The regulatory atmosphere within which Federal fishery management operates requires that management actions be taken in a manner that will optimize the conditions of resources, habitat, and human communities. Consistent with NEPA, the M-S Act requires that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. Given this regulatory environment, and because fishery management actions must strive to create and maintain sustainable resources, impacts on all VECs (except short-term impacts to human communities) from past, present and reasonably foreseeable future actions, when combined with baseline conditions, have generally been positive and are expected to continue in that manner for the foreseeable future. This is not to say that some aspects of the various VECs are not experiencing negative impacts, but rather that when taken as a whole and compared to the level of unsustainable effort that existed prior to and just after the fishery came under management control, the overall long-term trend is positive.

Table 94 below is provided as a summary of likely cumulative effects found in the various groups of management alternatives contained in Framework 47. Impacts are listed as no impact/neutral, positive, negative, or mixed. Impacts listed as no impact/neutral include those alternatives that have no impact or have a neutral impact (neither positive nor negative). Impacts listed as mixed contain both positive and negative impacts. The resultant cumulative effect is the CEA baseline that, as described above in Table 93, represents the sum of the past, present, and reasonably foreseeable future (identified hereafter as "other") actions and conditions of each VEC. When an alternative has a positive effect on a VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with the "other" actions that were also designed to increase stock size. In contrast, when an alternative has a negative effect on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the "other" actions. The resultant positive and negative cumulative effects are described below for each VEC and are exhibited in Table 94.

Managed Resources

As noted in Table 93, the combined impacts of past federal fishery management actions have led to short-term impacts that result in overfishing and/or overfished status for several stocks. However, management measures, in particular modifications implemented through Amendment 16 to the FMP, are expected to yield rebuilt sustainable groundfish stocks in the future. The actions proposed by Framework 47 are expected to continue this trend. Updates to status determination criteria, rebuilding programs, and ACLs for FY 2012–2014, including the setting of U.S./Canada TACs, are expected to have positive impacts on the managed groundfish resources. These measures all increase the likelihood that mortality targets will be achieved and should continue groundfish rebuilding. The changes to commercial fishery measures (modification of restrictions on scallop fishery catch of yellowtail flounder in GB access areas, removal of common pool restricted gear areas, and additional accountability measures for four stocks) are also expected to have positive impacts as they reduce the risk that ACLs will be exceeded. The past and present impacts, combined with the Preferred Alternative and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to managed resources in the long term.

Non-Target Species

As noted in Table 93, the combined impacts of past federal fishery management actions have decreased fishing effort and improved habitat protection for non-target species. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort, and decrease bycatch and discards. The actions proposed by Framework 47 are expected to continue this trend. The adoption of fishery specifications proposed is not expected to have any impacts on non-target species. The specifications implement mortality objectives adopted in Amendment 16 and thus are not expected to have any impacts beyond those described in that action. The modifications in effort controls in this action are not expected to impact non-target species. These changes only affect fishing in discrete geographic areas and by gear types that do not have a significant impact on non-target species. The past and present impacts, combined with the Preferred Alternative and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to non-target species.

Protected Resources

As noted in Table 93, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore reduced interactions with protected resources. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort and catch, and therefore continue to lessen interactions with protected resources. The actions proposed by Framework 47 are expected to continue this trend; however, as stocks rebuild to sustainable levels, future actions may lead to increased effort, which may increase potential interactions with protected species. Proposed changes to fishery specifications could have varying impacts on protected species. While the setting of ACLs is not expected to have any direct impacts, the increase in allowable catches for a few stocks may have minor negative effects. However, the reduction of ACLs for other stocks will likely preclude any overall increase in fishing effort. The modifications in commercial fishery measures are not expected to have major impacts, since they will not change fishing in areas or with gears that affect protected species. Overall, the combination of past, present, and future actions is expected to stabilize protected species interactions and lead to positive impacts to protected species.

Habitat, Including EFH

As noted in Table 93, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore have been positive for habitat protection. In addition, better control of non-fishing activities has also been positive for habitat protection. However, both fishing and non-fishing activities continue to decrease habitat quality. None of the fishery specifications measures are expected to substantial impacts to habitat or EFH. Generally, the modifications to commercial fishery measures are expected to have neutral or no impacts, since these actions should not greatly alter fishing practices and largely control the fishery from exceeding its ACLs. Overall, the combination of past, present, and future actions is expected to reduce fishing effort and hence reduce damage to habitat; however, it is likely that fishing and non-fishing activities will continue to degrade habitat quality.

Human Communities

As noted in Table 93, the combined impacts of past federal fishery management actions have reduced effort, and therefore have curtailed fishing opportunities. Past and current management measures, including those implemented through Amendment 16 to the FMP, will maintain effort and catch limit controls, which together with non-fishing impacts such as rising fuel costs have had significant negative short term economic impacts on human communities. The specifications are expected to have long-term positive impacts on human communities as they promote stock rebuilding, but in the short-term revenues are mixed compared to what would be expected under the No Action alternative. Slightly increased ACLs for some stocks could have positive social impacts, however, these will be tempered by reductions in ACLs for other stocks and overall greater fishing effort is not likely. Specifying U.S./Canada TACs is not expected to have significant social impacts. Changes to the commercial and recreational fishery effort control measures are expected to have mixed, but relatively minor, impacts on communities. In the short term, this action is expected to produce slightly decreased revenue that will compound the significant economic impact on the fishing industry from past actions. However, this action alone is not expected to have significant socioeconomic impacts beyond what was anticipated in Amendment 16. Overall, the combination of past, present, and future actions is expected to enable a sustainable harvest of groundfish stocks, which should lead to a long term positive impact on fishing communities and economies.

Table 94 – Cumulative effects expected on the VECs

Management Measure		**VECs**				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
UPDATES TO STATUS DETERMINATION CRITERIA, FORMAL REBUILDING PROGRAMS, AND ANNUAL CATCH LIMITS	**REVISED STATUS DETERMINATION CRITERIA**	**Positive** – Revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive** – Overall revenues will increase as stocks rebuild however, revenues under the revised specs would be less than no action
	REVISED GB YELLOWTAIL FLOUNDER REBUILDING STRATEGY	**Positive** – Revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive** – Overall revenues will increase as stocks rebuild however, revenues under the revised specs would be less than no action

Table 94 cont'd.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
UPDATES TO STATUS DETERMINATION CRITERIA, FORMAL REBUILDING PROGRAMS, AND ANNUAL CATCH LIMITS (cont.)	**U.S./CANADA RESOURCE SHARING UNDERSTANDING TACs**	**Positive** – Specification of TACs ensures combined U.S./Canada catches of EGB cod, haddock, and GB yellowtail flounder are consistent with mortality targets	**No impact/ Neutral** – Limiting catches of these stocks unlikely to affect non-target species compared to No Action	**Mixed/ Unknown** – Specification of TACs does not appreciably change fishing effort in GB area compared to No Action	**No Impact/ Neutral** – Specification of TACs does not appreciably change fishing effort in GB area compared to No Action	**No impact/ Neutral** – Measure promotes stock rebuilding, but little difference from No Action alternative
	ADMINISTRATION OF SCALLOP FISHERY SUB-ACLS	**Neutral** – Modifications to administration do not change level of risk that yellowtail flounder mortality targets will be exceeded	**No Impact/ Neutral** – Unlikely to have significant impacts on scallops and other non-target species	**Mixed/ Negative** – May marginally increase scallop dredge effort if yellowtail flounder allocation allows additional fishing	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive** – Allocation may increase access to scallop resources and does not affect access to groundfish

	ANNUAL CATCH LIMIT SPECIFICATIONS	**Positive** – Revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive** – Overall revenues will increase as stocks rebuild, however revenues under the revised specs would be less than no action
COMMERCIAL FISHERY MEASURES	**SCALLOP CATCH OF YELLOWTAIL FLOUNDER IN GB ACCESS AREAS – MODIFICATION OF RESTRICTIONS**	**No impact/ Neutral** – Allowing catch of yellowtail flounder in scallop access areas does not change risk that mortality targets will be exceeded	**No impact/ Neutral** – Possible increased fishing in access areas is not expected to create additional impacts to non-target species	**No Impact/ Neutral** – Possible increased fishing in access areas is not expected to create additional impacts to protected species	**No Impact/ Neutral** – Possible increased fishing in access areas is not expected to create additional impacts to habitat	**Positive** – More opportunities in the scallop fishery will allow for more flexibility in fishing practices
	COMMON POOL RESTRICTED GEAR AREAS	**No impact/ Neutral** – Removal of restricted gear areas does not change risk that mortality targets will be exceeded	**No impact** – Removal of restricted gear areas is not expected to create additional impacts to non-target species	**No impact** – Removal of restricted gear areas is not expected to create additional impacts to protected species	**No impact** – Removal of restricted gear areas is not expected to create additional impacts to habitat	**Positive** – Removal of restrictions provides for greater flexibility in fishing practices
	ACCOUNTABILITY MEASURES	**Positive** – More effective accountability measures will reduce risk of exceeding mortality targets on these stocks and promote rebuilding	**No impact** – accountability measures are not expected to create additional impacts to non-target species	**No impact** – accountability measures are not expected to create additional impacts to protected species	**No impact** – accountability measures are not expected to create additional impacts to habitat	**Mixed** – Overall revenues will increase as stocks rebuild, however restrictions may constrain fishing

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8.0 Applicable Law

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any fishery management plan or amendment be consistent with the ten national standards listed below.

Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
Amendment 16 to the Northeast Multispecies FMP adopted measures designed to end overfishing on the groundfish stocks that were subject to excessive fishing pressure at the time of its development. This action adjusts those measures in a way that is designed to maximize optimum yield while preventing overfishing and continuing rebuilding plans. For overfished fisheries, the Magnuson-Stevens Act defines optimum yield as the amount of fish which provides for rebuilding to a level consistent with producing the maximum sustainable yield from the fishery. The measures are designed to achieve the fishing mortality rates, and yields, necessary to rebuild the overfished stocks as well as to keep fishing mortality below overfishing levels for stocks that are not in a rebuilding program. The measures in Section 4.1 that adopt status determination criteria and ACLs set controls on catch to ensure that the appropriate fishing mortality rates are implemented. Changes to commercial and recreational fishery measures in Section 4.2 implement and adjust programs to achieve the desired mortality levels.

Conservation and management measures shall be based on the best scientific information available.
The Preferred Alternatives are based on the most recent estimates of stock status available for each of twenty stocks included in the management unit. These estimates are mostly in the form of information provided by the Northeast Fisheries Science Center in the GARM III proceedings. In the case of Atlantic wolffish, stock status was estimated by the NEFSC in the proceedings of the Data Poor Working Group (DPWG). The most recent (2011) TRAC proceedings, SARC 50 for pollock, the SARC 52 for winter flounders, and the SARC 53 for GOM cod were also used to update stock status. For all stocks under the GARM III, stock size and fishing mortality in calendar year 2007 was estimated based on catch, trawl survey, observer, and other data through 2007. Management targets for this action are also based on the results of the GARM III and the DPWG, which contain a comprehensive review of fishing mortality thresholds and biomass targets for the groundfish complex. Additionally, the proposed mortality limits were determined based on the scientific advice of the SSC, which recommends ABCs to the Council.

With respect to bycatch information, the action uses bycatch information from the most recent assessments. Bycatch data from observer reports, vessel logbooks, or other sources must be rigorously reviewed before conclusions can be drawn on the extent and amount of bycatch. While additional observer data has been collected since the most recent assessments were completed, it has not been analyzed or reviewed through the stock assessment process and thus cannot be used.

The economic analyses in this document are based primarily on landings, revenue, and effort information collected through the NMFS data collection systems used for this fishery.

To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
The Preferred Alternatives manage each individual groundfish stock as a unit throughout its range. Management measures specifically designed for one stock, including ACLs and trip limits, are applied to the entire range of the stock. In addition, the groundfish complex as a whole is managed in close coordination. Management measures are designed and evaluated for their impact on the fishery as a whole.

Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
The Preferred Alternatives do not discriminate between residents of different states. They are applied equally to all permit holders, regardless of homeport or location. While the measures do not discriminate between permit holders, they do have different impacts on different participants. This is because of the differences in the distribution of fish and the varying stock levels in the complex. For example, potentially low ACLs on GOM cod could differentially impact fishermen in the northern states who rely more heavily on that particular stock. Some of these impacts may be localized, as often communities near the stock may have developed small boat fisheries that target it. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. Even if the measures are designed to treat all permit holders the same, the fact that fish stocks are not distributed evenly, and that individual vessels may target specific stocks, means that distributive impacts cannot be avoided.

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

The Preferred Alternatives are not expected to significantly reduce the efficiency of fishing vessels. These measures are considered practicable since they allow rebuilding of depleted groundfish stocks and have considered efficiency to the greatest extent possible. Some of the Preferred Alternatives in fact increase efficiency, including the removal of restrictions on yellowtail flounder catch in scallop fishery access areas and removal of restricted gear areas. None of the measures in this action have economic allocation as their sole purpose – all are designed to contribute to the control of fishing mortality.

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

The primary effort controls used in this management plan - effort controls and sectors - allow each vessel operator to fish when and how it best suits his or her business. Vessels can make short or long trips, and can fish in any open area at any time of the year. The measures allow for the use of different gear, vessel size, and fishing practices. The specific measures adopted in this action do not reduce this flexibility.

Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
While some of the measures used in the management plan, and proposed by this action, tend to increase costs, those measures are necessary for achieving the plan's objectives. As an example, measures that reduce the efficiency of fishing vessels, including zero possession limits, tend to increase the costs of fishing vessels since fishing catches are reduced. These measures accomplish other goals, however, by allowing groundfish stocks to rebuild. The measures do not duplicate other regulatory efforts. Other measures, including the removal of restricted gear areas, have cost-minimization as a major purpose. Management of multispecies stocks in federal waters is not subject to coordinated regulation by any other management body. Absent Council action, a coordinated rebuilding effort to restore the health of the overfished stocks would not occur.

The Council considered the costs and benefits of a range of alternatives to achieve the goals and objectives of this FMP. It considered the costs to the industry of taking no action relative to adopting the measures herein. The expected benefits are greater in the long-term if stocks are rebuilt, though it is clear there are substantial short-term declines in revenue and possible increases in costs that can be expected.

Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse impacts on such communities.
Consistent with the requirements of the Magnuson-Stevens Act to prevent overfishing and rebuild overfished stocks, the Preferred Alternatives may restrict fishing activity through the implementation of low ACLs on certain stocks in order to achieve rebuilding targets. Analyses of the impacts of these measures show that landings and revenues are likely to decline for many participants in upcoming years due to the rebuilding programs in place for many stocks. In the short term, these declines will probably have negative impacts on fishing communities throughout the region, but particularly on those ports that rely heavily on groundfish. These declines are unavoidable given the M-S Act requirements to rebuild overfished stocks. The need to control fishing mortality means that catches cannot be as high as would likely occur with less stringent management measures.

Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
Many measures adopted in Amendment 16 were designed to limit the discards of both groundfish and some other species, including the sector management program, and this action is expected to continue those benefits with no substantial changes.

Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.
Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, in conjunction with Amendment 16 measures, are the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

8.1.2 Other M-SFCMA requirements

Section 303 (a) of FCMA contains 14 required provisions for FMPs. These are discussed below. It should be emphasized that the requirement is imposed on the FMP. In some cases noted below, the M-S Act requirements are met by information in the Northeast Multispecies FMP, as amended. Any fishery management plan that is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the National Standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

Foreign fishing is not allowed under this management plan or this action and so specific measures are not included to specify and control allowable foreign catch. The measures in this management plan are designed to prevent overfishing and rebuild overfished stocks. There is one international agreement that is germane to multispecies management. On December 20, 2010, the International Fisheries Clarification Act stipulated that the U.S./Canada Resource Sharing Understanding, implemented through Amendment 13, can be considered an international agreement for the purposes of setting ACLs. The proposed measures are consistent with that Understanding.

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

Amendment 16 included a thorough description of the multispecies fishery from 2001 through 2008, including the gears used, number of vessels, landings and revenues, and effort used in the fishery. This action provides a summary of that information and additional relevant information about the fishery in Section 6.5.

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

The present biological status of the fishery is described in Section 6.2. Likely future conditions of the resource are described 7.6.5. Impacts resulting from other measures in the management plan other than the specifications included here can be found in Amendment 16. The maximum sustainable yield for each stock in the fishery is defined in Amendment 16 and optimum yield for the fishery is defined in Amendment 9.

(4) assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

U.S. fishing vessels are capable of, and expected to, harvest the optimum yield from this fishery as specified in Amendment 16 and Frameworks 44 and 45. U.S. processors are also expected to process the harvest of U.S. fishing vessels. None of the optimum yield from this fishery can be made available to foreign fishing.

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

Current reporting requirements for this fishery have been in effect since 1994 and were originally specified in Amendment 5. They were slightly modified in Amendments 13 and 16, and VMS requirements were adopted in FW 42. The requirements include Vessel Trip Reports (VTRs) that are submitted by each fishing vessel. Dealers are also required to submit reports on the purchases of regulated groundfish from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

Provisions in accordance with this requirement were implemented in earlier actions, and continue with this action. For common pool vessels, the carry-over of a small number of DAS is allowed from one fishing year to the next. If a fisherman is unable to use all of his DAS because of weather or other conditions, this measure allows his available fishing time to be used in the subsequent fishing year. Sectors will also be allowed to carry forward a small amount of ACE into the next fishing year. This will help sectors react should adverse weather interfere with harvesting the entire ACE before the end of the year. Neither of these practices requires consultation with the Coast Guard.

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

Essential fish habitat was defined for Atlantic wolffish in Amendment 16, and for all stocks in an earlier action. A summary of the EFH can be found in Section 6.1.3.

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

Scientific and research needs are not required for a framework adjustment. Current research needs are identified in Amendment 16.

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on-- (A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Impacts of this framework on fishing communities directly affected by this action and adjacent areas can be found in Section 0.

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

Objective and measurable Status Determination Criteria for all species in the management plan are presented in Amendment 16,

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;

~~A Standardized Bycatch Reporting Methodology omnibus amendment was adopted by the Council in June 2007. That methodology applies to this framework. None of the measures in this framework are expected to increase bycatch beyond what was considered in Amendment 16.~~

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

This management plan does not include a catch and release recreational fishery management program and thus does not address this requirement.

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

As noted above, the description of the commercial, recreational, and charter fishing sectors was fully developed in Amendment 16, and the commercial sector is updated and summarized in this document (Section 6.5).

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

This preferred alternative does not allocate harvest restrictions or stock benefits to the fishery. Such allocations were adopted in Amendment 16, while this action adjusts catch limits for some stocks within the existing allocation structure. This action also proposes that PSC from canceled permits is redistributed to all remaining permits in the fishery; while not considered an allocative measure, that action does benefit all participants in the fishery equally.

(15) establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

8.1.3 EFH Assessment

This essential fish habitat (EFH) assessment is provided pursuant to 50 CFR 600.920(e) of the EFH Final Rule to initiate EFH consultation with the National Marine Fisheries Service.

8.1.3.1 Description of Action

The purpose of the Framework 47 (Northeast Multispecies FMP) Preferred Alternatives is to adopt modifications to management measures that will incorporate new information relative to effective program administration and setting catch levels that are necessary to achieve the fishing mortality targets required by Amendment 16.

In general, the activity described by this action, fishing for groundfish species, occurs off the New England and Mid-Atlantic coasts within the U.S. EEZ. Thus, the range of this activity occurs across the designated EFH of all Council-managed species (see Amendment 11 to the Northeast Multispecies FMP for a list of species for which EFH was designated, the maps of the distribution of EFH, and descriptions of the characteristics that comprise the EFH). EFH designated for species managed under the Secretarial Highly Migratory Species FMPs are not affected by this action, nor is any EFH designated for species managed by the South Atlantic Council as all of the relevant species are pelagic and not directly affected by benthic habitat impacts.

The Preferred Alternatives are described in Section 4.0. The alternatives include the following general measures:

- Revisions to status determination criteria for three winter flounder stocks and GOM cod
- A revised rebuilding strategy for GB yellowtail flounder

- Updated TACs for stocks managed consistent with the U.S./Canada Resource Sharing Understanding
- Revisions to the administration of scallop fishery groundfish sub-ACLs
- Revised ACL specifications for FY 2012 – FY 2014
- Maintenance of the SNE/MA winter flounder management measures
- Removal of the cap on yellowtail flounder that can be harvested by the scallop fishery in access areas
- Maintenance of the prohibition on possession of Atlantic wolffish
- Removal of common pool restricted gear areas
- Revisions to AMs for ocean pout, windowpane flounder stocks, Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder

8.1.3.2 Assessing the Potential Adverse Impacts

Refer to the Habitat Impacts of the Alternatives (Section 7.2, summarized in Section 7.2.3) for a tabular look at the summary impacts of the Preferred Alternatives. Nearly all measures are expected to have neutral impacts on habitat.

Measures with Potential Negative Effects on EFH

None of the measures are expected to have negative effects on EFH.

Measures with Potential Positive Effects on EFH

Two of the Preferred Alternatives may have positive effects on EFH, but these effects are expected to be minor and may not be measureable.

Table 95 – Measures with potential positive effects on EFH

SNE/MA Winter Flounder management measures – prohibit possession	0/+	No Action alternative preferred; may marginally reduce fishing effort in SNE but any differences compared to Option 2 are marginal.
Access Area Catch of Yellowtail Flounder – Remove Cap	+	Since more scallop effort likely to take place in access areas, that generally have higher CPUEs, impacts to EFH likely to be reduced

8.1.3.3 Minimizing or Mitigating Adverse Impacts

Section 7.2 (habitat impacts of the alternatives) demonstrates that the overall habitat impacts of all the measures combined in this action have neutral impacts relative to the baseline habitat protections established under Amendment 13 to the Northeast Multispecies FMP. As such, additional measures to mitigate or minimize adverse effects of the multispecies fishery on EFH beyond those established under Amendment 13 are not necessary.

8.1.3.4 Conclusions

The Preferred Alternatives are unlikely to have noticeable impacts on EFH; there may be slight positive benefits when compared to the other alternatives.

8.2 National Environmental Policy Act (NEPA)

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the M-S Act and NEPA. The Council on Environmental Quality (CEQ) has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), as has NOAA in its agency policy and procedures for NEPA in NAO 216-6 §5.04b.1. All of those requirements are addressed in this document, as referenced below.

8.2.1 Environmental Assessment

The required elements of an Environmental Assessment (EA) are specified in 40 CFR 1508.9(b) and NAO 216-6 §5.04b.1. They are included in this document as follows:

- The need for this action is described in Section 3.2;
- The alternatives that were considered are described in Section 4.0;
- The environmental impacts of alternatives are described in Section 7.0;
- The agencies and persons consulted on this action are listed in Section 8.2.4.

While not required for the preparation of an EA, this document includes the following additional sections that are based on requirements for an Environmental Impact Statement (EIS).

- An Executive Summary can be found in Section 1.0.
- A table of contents can be found in Section 2.0.
- Background and purpose are described in Section 2.0.
- A summary of the document can be found in Section 1.0.
- A brief description of the affected environment is in Section 6.0.
- Cumulative impacts of the Preferred Alternatives are described in Section 7.6.
- A determination of significance is in Section 8.2.2.
- A list of preparers is in Section 0.
- The index is in Section 9.3.

8.2.2 Finding of No Significant Impact (FONSI)

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

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

Response: The preferred alternatives cannot reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action. With respect to the target species in the Northeast Multispecies fishery the Preferred Alternatives adopt catch limits that are consistent with target fishing mortality rates that promote rebuilding and/or sustaining stock sizes.

(2) *Can the Preferred Alternatives reasonably be expected to jeopardize the sustainability of any non-target species?*

Response: For fishery resources that are caught incidental to groundfish fishing activity, there is no indication in the analyses that the alternatives will threaten sustainability. The Preferred Alternatives will result in relatively small changes in groundfish fishing effort and since the fishery does not currently jeopardize non-target species it is not likely that these alternatives will change that status.

(3) *Can the Preferred Alternatives 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?*

Response: The Preferred Alternatives cannot reasonably be expected to cause substantial damage to the oceans and coastal habitats and/or essential fish habitat. Analyses described in section 7.2 indicate that only minor impacts are expected.

(4) *Can the Preferred Alternatives be reasonably expected to have a substantial adverse impact on public health or safety?*

Response: Nothing in the Proposed Action can be reasonably expected to have a substantial adverse impact on public health or safety. Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near term future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

(5) *Can the Preferred Alternatives reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response: The Preferred Alternatives cannot be reasonably expected to adversely affect endangered or threatened species. For the reasons discussed in Sections 6.4, 7.6.5, and 8.3, the continued operation of the NE Multispecies FMP is not likely to jeopardize the continued existence of any Atlantic sturgeon DPS during the reinitiation period. This is due to the short time period encompassed by the reinitiation period, and consequently, the scale of any interactions with Atlantic sturgeon that may occur during this period. NMFS will implement any appropriate measures outlined in the Biological Opinion to mitigate harm to Atlantic sturgeon. Further, the encounter rates and mortalities for Atlantic sturgeon that have been calculated as part of the preliminary analysis of NEFOP data (as discussed in Sec 6.4.4) include encounters and mortalities by all fisheries utilizing large-mesh sink gillnet and otter trawl gear, including the spiny dogfish, and monkfish fisheries. Thus, it is likely that rates of encounters and mortalities by the groundfish fishery would be lower than those estimates. Therefore, impacts resulting from the approval of FW 47 are not likely to be significant.

(6) *Can the Preferred Alternatives 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.)?*

Response: The Preferred Alternatives are not expected to have a substantial impact on biodiversity and/or ecosystem function with the affected area. The use of ACLs will tightly control catches of target and incidental regulated groundfish stocks. Catches of target and incidental catch species under this program will be consistent with the mortality targets of Amendment 16, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH. It is therefore reasonable to expect that there will not be substantial impact on biodiversity or ecosystem function.

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

Response: The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternatives. The Preferred Alternatives are designed to implement specifications and modifications to continue the groundfish rebuilding programs that were implemented as a result of Amendments 13 and 16 to the Northeast Multispecies FMP. As described in Section 7.1, the action is expected to continue the rebuilding trajectories for most stocks that have been adopted. The action cannot be reasonably expected to have a substantial impact on habitat or protected species (see Sections 7.2 and 7.3), as the impacts are expected to fall within the range of those resulting from Amendment 16. The action's potential economic and social impacts are also addressed in the environmental assessment (see Sections 7.4 and 7.5, respectively) and more specifically in the Executive Order 12866 review (Section 8.11.1) and the Initial Regulatory Impact Review (Section 8.11).

NMFS has determined that despite the potential socio-economic impacts resulting from this action, there is no need to prepare an EIS. The purpose of NEPA is to protect the environment by requiring federal agencies to consider the impacts of their Proposed Action on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." This EA for Framework 47 describes and analyzes the proposed measures and alternatives and concludes there will be no significant impacts to the natural and physical environment. While some fishermen, shore-side businesses and others may experience impacts to their livelihood, these impacts in and of themselves do not require the preparation of an EIS, as supported by NEPA's implementing regulations at 40 C.F.R. 1508.14. Consequently, because the EA demonstrates that the action's potential natural and physical impacts are not significant, the execution of a FONSI remains appropriate under Criteria 7.

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

<u>Response</u>: The effects of the preferred measures on the quality of human environment are not expected to be highly controversial. The need to rebuild groundfish stocks is well-documented. While there has been some debate over how quickly to rebuild those stocks and the desired biomass for each stock, legal requirements established by the M-S Act render these discussions moot. These issues were also resolved with the adoption of Amendment 16, and with the exception of the GB yellowtail flounder rebuilding strategy this action does not modify those rebuilding plans. The effects of modifying the GB yellowtail flounder rebuilding schedule are not expected to be controversial since the proposed action was supported by industry and will allow catch on other stocks to be more fully optimized while staying within the boundaries of the M-S Act requirements.

(9) *Can the Preferred Alternatives 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?*

<u>Response</u>: No, the Preferred Alternatives cannot be reasonably expected to result in substantial impacts to unique areas or ecological critical areas. The only designated HAPC in the areas affected by this action is protected by an existing closed area that would not be affected by this action. In addition, vessel operations around the unique historical and cultural resources encompassed by the Stellwagen Bank National Marine Sanctuary would not likely be altered by this action. As a result, no substantial impacts are expected from this action.

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

<u>Response</u>: The Preferred Alternatives are not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The effort control measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks and initiated stock rebuilding. The administrative measures are relatively minor modifications that were anticipated by Amendment 16. While there is a degree of uncertainty over how fishermen will react to the proposed measures, the analytic tools used to evaluate the measures attempt to take that uncertainty into account and reflect the likely results as a range of possible outcomes. For example, the economic analysis in Section 7.4 illustrates the distribution of results that are expected rather then provide only a point estimate. Since ultimately the availability of a choice of whether to join a sector will serve to mitigate social and economic impacts, uncertainty over sector membership cannot be seen as a significant source of risk. Overall, the impacts of the Preferred Alternatives can be, and are, described with a relative amount of certainty.

(11) *Is the Preferred Alternative related to other actions with individually insignificant, but cumulatively significant impacts?*

<u>Response</u>: The Proposed Action is not related to other actions with individually insignificant but cumulatively significant impacts. Recent management actions in this fishery include FW 42, FW 43, Amendment 16, FW 44, FW 45, and FW 46. FW 42 developed specific measures implementing programs adopted by Amendment 13; each was determined to be insignificant. FW 43 adopted limits on groundfish bycatch by mid-water trawl herring vessels and was not determined to have a significant effect on either the groundfish or herring fisheries. Amendment

16 had significant impacts and thus required the preparation of an EIS, while Frameworks 44 and 46 set specifications as required under Amendment 16 and made relatively minor adjustments to the sector administration program. Framework 46 modified the amount of haddock that may be caught by the midwater herring fishery. The measures in this action were anticipated by Amendment 16 and thus cannot be said to have different cumulative impacts that were not foreseen and addressed in the amendment. Therefore, the Preferred Alternatives, when assessed in conjunction with the actions noted above, would not have significant impacts on the natural or physical environment.

(12) *Are the Preferred Alternatives likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources?*

<u>Response</u>: The Preferred Alternatives is not likely to affect objects listed in the National Register of Historic Places or cause significant impact to scientific, cultural, or historical resources. The only objects in the fishery area that are listed in the National Register of Historic Places are several wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternatives would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near wrecks to avoid tangling gear. Therefore, this action would not result in any adverse effects to wrecks.

(13) *Can the Preferred Alternatives reasonably be expected to result in the introduction or spread of a non-indigenous species?*

<u>Response:</u> This action would not result in the introduction or spread of any non-indigenous species, as it would not result in any vessel activity outside of the Northeast region.

(14) *Are the Preferred Alternatives likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

<u>Response:</u> No, the Preferred Alternatives are not likely to establish precedent for future actions with significant effects. The Preferred Alternatives adopts measures that are designed to react to the necessity to reduce fishing mortality for several groundfish stocks in order to achieve the fishing mortality targets adopted by Amendment 16 and Frameworks 44 and 45. As such, these measures are designed to address a specific problem and are not intended to represent a decision about future management actions that may adopt different measures.

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

<u>Response:</u> The Preferred Alternatives are intended to implement measures that would offer further protection of marine resources and would not threaten a violation of Federal, state, or local law or requirements to protect the environment.

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

<u>Response:</u> As specified in the responses to the first two criteria of this section, the Preferred Alternatives are not expected to result in cumulative adverse effects that would have a substantial

effect on target or non-target species. This action would maintain fishing mortality within M-S Act requirements for several groundfish stocks, with no expected increase in mortality for non-target and non-groundfish stocks.

FONSI STATEMENT: In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Framework Adjustment 47 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 47 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 required.

9 MAR 2012

ACTING
Northeast Regional Administrator, NOAA

Date

8.2.3 List of Preparers; Point of Contact

Questions concerning this document may be addressed to:

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8.2.4 Agencies Consulted

The following agencies were consulted in the preparation of this document:

Mid-Atlantic Fishery Management Council
New England Fishery Management Council, which includes representatives from the following additional organizations:
- Connecticut Department of Environmental Protection
- Rhode Island Department of Environmental Management
- Massachusetts Division of Marine Fisheries
- New Hampshire Fish and Game
- Maine Department of Marine Resources

National Marine Fisheries Service, NOAA, Department of Commerce
United States Coast Guard, Department of Homeland Security

8.2.5 Opportunity for Public Comment

The Preferred Alternatives were developed during the period January 2011 through November 2011 and was discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Date	Meeting Type	Location
2011		
1/10/11	PDT	Mass Audubon, Newburyport, MA
1/19/11	Oversight Committee	Clarion Hotel, Portland, ME
1/25-1/27/11	Council Meeting	Sheraton Harborside, Portsmouth, NH
2/17/11	PDT Conference Call	
3/7/11	PDT Conference Call	
3/17/11	Oversight Committee	Crowne Plaza, Danvers, MA
4/18/11	Oversight Committee	Holiday Inn, Mansfield, MA
5/9/11	PDT Conference Call	
5/26/11	Oversight Committee	Crowne Plaza, Danvers, MA
6/21/-6/23/11	Council Meeting	Holiday Inn by the Bay, Portland, ME
7/11/11	PDT Conference Call	
7/28/11	PDT Conference Call	
8/5/11	PDT Conference Call	

Date	Meeting Type	Location
8/11/11	Oversight Committee	Crowne Plaza Danvers
9/26-28/11	Council Meeting	Sheraton Ferncroft, Danvers, MA
10/5/11	Oversight Committee	Springhill Suites, Peabody, MA
11/1/11	Recreational Advisory Panel	Radisson Hotel, Plymouth, MA
11/1/11	Advisory Panel	Radisson Hotel, Plymouth, MA
11/2/11	Oversight Committee	Radisson Hotel, Plymouth, MA
11/15-17/11	Council Meeting	Newport Marriott, Newport, RI

8.3 Endangered Species Act

On February 3, 2012, NMFS published final rules listing the Gulf of Maine distinct population segment (DPS) of Atlantic sturgeon as threatened, and listing the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon as endangered, effective April 6, 2012. Preliminary analysis indicates that multiple Atlantic sturgeon DPSs may be affected by the continued operation of the NE multispecies fishery and formal consultation under Section 7 of the ESA has been reinitiated and is ongoing for the NE multispecies fishery. The previous Biological Opinion for the NE multispecies fishery completed in October 2010 concluded that the actions considered would not jeopardize the continued existence of any listed species. This Biological Opinion will be updated and additional evaluation will be included to describe any impacts of the NE multispecies fishery on Atlantic sturgeon DPSs and define any measures needed to mitigate those impacts, if necessary. It is anticipated that any measures, terms and conditions included in an updated Biological Opinion will further reduce impacts to the species. It is expected that the completion of the Biological Opinion will occur before the beginning of the 2012 NE multispecies fishing year on May 1, 2012. NMFS has determined that continued operation of the fishery during the consultation period is not likely to jeopardize the continued existence of listed species.

The information presented in Sections 6.2.4, 7.6.5 of Framework 47 support the conclusion from earlier bycatch estimates that the multispecies fishery may interact with Atlantic sturgeon from now until the Biological Opinion will be completed, but the magnitude of that interaction during the timeframe of interest is not likely to cause an appreciable reduction in survival and recovery. The Biological Opinion will include additional evaluation to describe any impacts of the fisheries on Atlantic sturgeon and define any measures needed to mitigate those impacts, if necessary. Any measures or terms and conditions included in an updated Biological Opinion are expected to further reduce impacts to the species.

8.4 Marine Mammal Protection Act

NMFS has reviewed the impacts of the Preferred Alternatives on marine mammals and has concluded that the management actions proposed are consistent with the provisions of the MMPA. Although they are likely to affect species inhabiting the multispecies management unit, the measures will not alter the effectiveness of existing MMPA measures, such as take reduction plans, to protect those species based on overall reductions in fishing effort that have been implemented through the FMP

For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Section 7.2.3 of this document.

8.5 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 Section 930.36(c) of the regulations implementing the Coastal Zone Management Act, NMFS made a general consistency determination that the Northeast Multispecies Fishery Management Plan (FMP), including Amendment 16, and Framework Adjustment 47, is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. This general consistency determination applies to the current NE Multispecies Fishery Management Plan (FMP), and all subsequent routine federal actions carried out in accordance with the FMP such as Framework Adjustments and specifications. A general consistency determination is warranted because Framework Adjustments to the FMP are repeated activities that adjust the use of management tools previously implemented in the FMP. A general consistency determination avoids the necessity of issuing separate consistency determinations for each incremental action. This determination was submitted to the above states on October 21, 2009. To date, the states of North Carolina, Rhode Island, Virginia, Connecticut, New Hampshire, and Pennsylvania have concurred with the General Consistency Determination. Consistency was inferred for those states that did not respond.

8.6 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedure Act, and these requirements will continue to be followed when the proposed regulation is published. 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.

8.7 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.

8.7.1 Utility of Information Product

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

This document is available in several formats, including printed publication, CD-ROM, and online through the Council's web page in PDF format. 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.

8.7.2 Integrity of Information Product

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.

8.7.3 Objectivity of Information Product

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. These update assessments were reviewed by the SAW 50 (NEFSC 2010), the Groundfish Assessment Review Meeting III (GARM III; NEFSC 2008), the Northeast Data Poor Stocks Working Group (DPWG 2009), and SAW 52 (NEFSC 2011) which all included participation by independent stock assessment scientists. 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 Groundfish Plan Development Team/Monitoring Committee.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the Preferred Alternatives were conducted using information from the most recent complete calendar years, through 2010, and in some cases includes information that was collected during the first eight months of calendar year 2011. Complete data were not available for calendar year 2010. The data used in the analyses provide the best available information on the number of harvesters in the fishery, the catch (including landings and discards) by those harvesters, the sales and revenue of those landings to dealers, the type of permits held by vessels, the number of DAS used by those vessels, the catch of recreational fishermen and the location of those catches, and the catches and revenues from various special management programs. 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 the groundfish fishery.

The policy choices are clearly articulated, in Section 4.0 of this document, 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 7.0 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.

8.8 Executive Order 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 in FW 47. 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.

8.9 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. As of the date of submission of this FMP, the list of MPA sites has not been developed by the departments. No further guidance related to this Executive Order is available at this time.

8.10 Paperwork Reduction Act

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. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

FW 47 does not modify existing collection of information requirements implemented by previous amendments to the FMP that are subject to the PRA, including:

- Reporting requirements for SAPs and the Category B (regular) DAS Program
- Mandatory use of a Vessel Monitoring System (VMS) by all vessels using a groundfish DAS
- Changes to possession limits, which will change the requirements to notify NMFS of plans to fish in certain areas
- Provisions to allow vessel operators to notify NMFS of plans to fish both inside and outside the Eastern U.S./CA area on the same fishing trip

8.11 Regulatory Impact Review

8.11.1 Executive Order 12866

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 8.11 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.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may:

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The following discussion is limited to a determination of significance of the proposed action based solely on economic criteria. Two aspects of the proposed action have measurable economic impacts: accountability measures (AMs) to prevent overfishing on four groundfish species (wolffish, ocean pout, halibut and windowpane flounder) and updated annual catch levels (ACLs) for all 16 allocated groundfish stocks. Other proposed actions such as revised status determination criteria for winter flounder, rebuilding strategies for yellowtail flounder, US/Canada resource sharing agreement changes, and sub-ACLs for the scallop fishery may have economic impacts via changes in ACLs, but it is the ACLs themselves that affect gross revenues from fishing.

A more detailed discussion of economic impact is provided in Section 7.4. The discussion to follow provides a summary of those findings.

8.11.1.1 Summary of Impacts on Fishing Revenue

Accountability Measures

AMs for these four species include area-based gear modifications and, in the case of halibut, a zero possession limit and a complete closure of certain areas to fixed gears. For most areas, the proposed action would require vessels to modify their fishing gear to use selective gears (with a raised footrope) that are less likely to catch the species of concern, or to modify their fishing locations to avoid the AM gear restricted areas.

The costs associated with changing gears are not well understood, but are not expected to be significant. Reported VTR-reported gross revenues for trips occurring inside all proposed gear restricted areas are approximately $11 million. Using selective gears changes the composition of the catch for affected trips, and likely reduces gross revenues though the amount of this reduction is not known. Likewise, changing fishing locations will incur a cost in reduced gross revenues and possibly increased costs for affected trips but the exact amount of these changes is not known. Also, AMs are unlikely to affect an entire fishing year, as they will only be triggered once an ACL is exceeded. Changing fishing locations and/or using selective gears is unlikely to have more than a 10% change in gross revenues, as other fishing opportunities exist relatively close by the affected areas.

If the AM were to be triggered halfway through the fishing year and if gear modification and/or altered fishing locations resulted in a 10% reduction in net revenues on affected trips, the result would be approximately $500K in lost net revenues. The Atlantic halibut fixed gear restricted area prohibits fishing in this area by fixed gear vessels. If the AM were triggered six months in to the fishing year it may affect approximately $0.5 million dollars of gross revenues. Assuming again a 10% reduction in net revenues due to displacement, this AM would come at a cost of approximately $50K to the gillnet fishery taking place in these areas.

Accountability measures are estimated to reduce groundfish fishing revenues by approximately $500K in aggregate across the fishery. This represents less than one half of one percent of total revenues for impacted vessels in FY 2010.

Annual Catch Limits
Commercial sub-ACLs for 14 of the 16 stocks increase or are held constant relative to FY 2010 and FY 2011 levels under all options considered. The economic impacts of the proposed action are most closely linked to the sub-ACLs of the two stocks with decreasing allocations, Georges Bank yellowtail flounder and Gulf of Maine cod.

The proposed action specifies a GOM cod commercial sector sub-ACL of 577,000 lbs, representing a 94% reduction from similar allocations in FY 2010. The GB yellowtail flounder commercial sector sub-ACL is proposed to drop to 471,000 pounds, a 73% reduction from this baseline allocation.

The proposed action will have an estimated adverse impact on total gross revenues from fishing of $40 million relative to the FY2010 baseline. This represents a 35% reduction in gross revenues from FY2010. This decline is attributable primarily to the change in the GOM cod allocation, though vessels fishing in the Georges Bank stock area will also be affected by the reduced allocation of GB yellowtail flounder.

Under the proposed action, groundfish vessels fishing from GOM-based ports such as Boston, Gloucester, Portland and ports in New Hampshire are predicted to see the largest declines in gross revenues from groundfish fishing, though all states including those in southern New England are estimated to see substantial declines in gross revenues from groundfish fishing (Table 96). Smaller vessels (length less than 50 ft) are estimated to be more adversely affected than larger vessels (Table 97). Gillnet vessels are estimated to be more adversely affected than otter trawl and longline vessels (Table 98).

The proposed action allocates fishable quota (ACE) to Sectors, all of which are free to lease or trade quota among themselves. In FY 2010 vessels leased at least $13 million worth of quota between Sectors. These transfer payments will help to offset direct losses in short-term revenues. As stocks like GOM cod and GB yellowtail flounder become constraining, their lease price on the quota market will increase. While the overall allocations of these two stocks total around one million pounds, lease prices in excess of $2/lbs would not be unexpected if these stocks do constrain fishing for more plentiful stocks.

Common pool vessels derived approximately $500K, or about 25% of their total revenues from groundfish, from GOM cod landings in FY 2010. Approximately $50K (2%) came from landings of GB yellowtail flounder. These totals represent less than 1% and 0.1% of total revenues by common pool vessels in FY 2010 (GOM cod and GB yellowtail, respectively). A reduction in revenues from these two stocks that is proportional to the change in sub-ACLs for the common pool would yield a loss of approximately $480K, representing less than 1% of total landings by common pool vessels on trips were groundfish was landed. It is not clear if this is an appropriate extrapolation, however, as common pool accountability measures may close the Gulf of Maine and/or Georges Bank stock areas to all groundfish fishing for common pool vessels early in the fishing year. This could restrict fishing opportunities for fisheries such as monkfish and skates, with a larger economic impact than the estimated ~$480K.

No management measures are specified that would affect party/charter businesses.

Annual catch limits are estimated to adversely affect vessels participating in the groundfish fishery by reducing fishing revenues by approximately $40.5 million in aggregate. This represents a reduction of approximately 35% in total revenues for affected vessels in FY 2010. See Section 7.4.1.5 for further details.

Table 96 – Impacts of proposed action on seven hailing port states ($ million, nominal 2010).

State	FY 2010			Proposed Action			% change
	ground fish	non-ground fish	Total	ground fish	non-ground fish	Total	
CONNECTICUT	0.0	0.1	0.1	0.0	0.0	0.0	-77%
MASSACHUSETTS	74.6	29.2	103.7	58.0	13.3	71.2	-31%
MAINE	3.6	0.7	4.2	1.9	0.3	2.3	-47%
NEW HAMPSHIRE	1.7	0.4	2.1	0.2	0.0	0.2	-91%
NEW YORK	0.1	0.5	0.6	0.1	0.1	0.2	-68%
RHODE ISLAND	1.6	3.2	4.7	1.0	0.7	1.7	-64%
OTHER	0.0	0.0	0.0	0.0	0.0	0.0	-46%
Grand Total	**81.5**	**34.1**	**115.5**	**61.1**	**14.5**	**75.6**	**-35%**

Table 97 – Impacts of proposed action on four vessel length classes ($ million, nominal 2010).

	FY 2010			Proposed Action			
Length	ground fish	non-ground fish	*Total*	ground fish	non-ground fish	*Total*	*% change*
<30 ft	0.0	0.0	0.1	0.0	0.0	0.0	-
30-50 ft	11.7	3.2	15.0	4.8	0.9	5.7	*-62%*
51-75 ft	27.3	12.4	39.7	18.9	4.2	23.1	*-42%*
75+ ft	42.4	18.5	60.8	37.5	9.4	46.9	*-23%*
Grand Total	**81.5**	**34.1**	**115.5**	**61.1**	**14.5**	**75.6**	***-35%***

Table 98 – Impacts of proposed action on three primary gear types ($ million, nominal 2010).

	FY 2010			Proposed Action			
Gear	ground fish	non-ground fish	*Total*	ground fish	non-ground fish	*Total*	*% change*
Otter trawl	72.0	31.2	103.2	56.9	13.8	70.7	*-32%*
Gillnet	7.8	2.8	10.6	2.7	0.7	3.4	*-68%*
Longline	1.7	0.0	1.8	1.5	0.0	1.6	*-11%*
Grand Total	**81.5**	**34.1**	**115.5**	**61.1**	**14.5**	**75.6**	***-35%***

8.11.1.1 Determination of Significance

The Proposed Action is not predicted to have an adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses in excess of $100 million. Adverse economic impacts will result from this proposed action throughout the range of the groundfish fishery. These impacts are estimated to be most significant for smaller vessels fishing in the inshore GOM. ACE trading and leasing will mitigate some of the adverse effects, and these transfer payments re expected to flow from larger vessels to smaller vessels, particularly those hailing from inshore Gulf of Maine ports. The potential decrease in gross revenues from fishing for groundfish under this action is estimated to be $35 million, falling short of the $100 million standard for significance.

8.11.2 Regulatory Flexibility Act

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 which includes an assessment of the effects that the Proposed Action and other Alternatives are expected to have on small regulated entities.

8.11.2.1 Economic Impacts on Regulated Small Entities

The primary economic impact of the proposed action is associated with the setting of annual catch levels (ACLs) and the resulting sub-ACLs to the commercial groundfish fishing fleet (including Sector and Common Pool vessels) as well as sub-ACLs to the herring and scallop fisheries. The size standard for regulated commercial fishing entities (NAICS code 114111) is $4 million in sales—regulated entities with less than $4 million in sales are considered small.

Commercial groundfish vessels in the Sector Program

The proposed action would affect regulated entities engaged in commercial fishing under the Northeast Multispecies Fishery Management Plan's Sector management system, established under the Plan's Amendment 16. Vessels electing to fish under this management system join a Sector, and their individual allocations of stock-specific fishing quota (called "Potential Sector Contributions" or PSC) become pooled within that Sector. Vessels do not have a right to catch their PSC individually, as it only becomes fishable quota upon Sector membership.

Section 3 of the Small Business Act defines affiliation as:

> Affiliation may arise among two or more persons with an identity of interest. Individuals or firms that have identical or substantially identical business or economic interests (such as family members, individuals or firms with common investments, or firms that are economically dependent through contractual or other relationships) may be treated as one party with such interests aggregated (13 CFR 121.103(f)).

It is the Sectors themselves and not individual vessels that are regulated by adjustments of Annual Catch Entitlements, as in the Proposed Action, and for purposes of the RFA Sectors are the appropriate regulated entity. We can use Sector rosters and landings data from FY 2010 to estimate baseline conditions, and preliminary Sector rosters for FY 2012 plus the quota change model to estimate the impacts of the proposed action on regulated small entities.

In the baseline period (FY 2010) there are seven large and ten small regulated entities. Mean gross sales of fish for the seven large entities is $13.7 million, while for the ten small entities it is just under $2 million. Under the proposed action, three Sectors would fall below the $4 million threshold, leaving four large and thirteen small regulated entities. Mean gross sales for large regulated entities are estimated at $9.5 million, a 30% reduction from the baseline. Mean gross sales for small regulated entities are estimated at $0.7 million, a 62% reduction from the baseline period (Table 99).

Table 99 – Impacts of the proposed action on large and small regulated entities ($ million, nominal 2010).

	N	Baseline	Proposed Action	*% reduction*
Regulated large	7	13.71	9.56	*-30%*
Regulated small	10	1.96	0.74	*-62%*

Commercial groundfish vessels in the Common Pool

During the baseline period (FY 2010), 343 commercial groundfish vessels in the common pool had at least one dollar in gross sales from fish. Of these, 342 are small regulated entities with mean gross sales of $156K. Although multiple vessels may be owned by a single owner available tracking of ownership is not readily available to reliably ascertain affiliated entities. For purposes of analysis, each permitted vessel is treated as a single entity.

Gross sales from groundfish, which represent the sales potentially affected by the proposed action, comprise less than 2% of this total—only $2.6K. The proposed action may trigger common pool accountability measures and thereby limiting opportunities to fish for groundfish, but the impact on small regulated entities will likely be insignificant.

Commercial Atlantic herring vessels

The Northeast Multispecies Fishery Management Plan allows for sub-allocations of regulated groundfish stocks for the purposes of bycatch in other fisheries, including sub-allocation of haddock intended as regulated bycatch for vessels permitted to fish for Atlantic herring under the Atlantic Herring Fishery Management Plan. Because the proposed action will decrease the available GOM and GB haddock Allowable Biological Catch for the groundfish fishery, vessels permitted in the Atlantic herring fishery are technically regulated by this action.

The size standard for commercial fishing entities (NAICS code 114111) is $4 million in sales. Although multiple vessels may be owned by a single owner available tracking of ownership is not readily available to reliably ascertain affiliated entities. For purposes of analysis, each permitted vessel is treated as a single entity. During calendar year 2010, 90 vessels were issued a limited access herring permit and two vessels exceeded the size standard for a regulated small entity (Table 100).

Approximately 17% of the haddock ABCs were landed in fishing year 2010, and similar utilization of available quota is expected under the proposed action (18% and 39% for GB and GOM haddock, respectively). Therefore, vessels participating in the Atlantic herring fishery are not affected by this action.

Table 100 – Limited access herring permitted vessel gross sales, by category and year (source: *NMFS permit and dealer data*)

Gross sales category		2010
(1) less than $100K		8
(2) btwn $100K and $500K		31
(3) btwn $500K and $1mil		20
(4) btwn $1mil and $4mil		25
(5) greater than $4mil		2
	Total	*86*

Commercial Atlantic sea scallop vessels

The Northeast Multispecies Fishery Management Plan allows for sub-allocations of regulated groundfish stocks for the purposes of bycatch in other fisheries, including a sub-allocation of yellowtail flounder intended as regulated bycatch for vessels permitted to fish for Atlantic sea scallops under the Atlantic Sea Scallop Fishery Management Plan. Because the proposed action will decrease the available GB yellowtail flounder sub-ACL for the scallop fishery, vessels permitted in this fishery are technically regulated by this action.

The GB yellowtail flounder sub-ACL is expected to decrease by 73% under the proposed action. If scallop vessels participating in either open-area or access-area trips exceed their sub-allocation of yellowtail flounder bycatch, the following AM applies:

> *If, by January 15 of each year, the Regional Administrator determines that a yellowtail flounder sub-ACL for the scallop fishery will be exceeded, the specified statistical areas with highest YT bycatch rates will be closed to scallop*

> *fishing on March 1 and remain closed for a specified length of time depending on the percentage overage (Atl. Sea Scallop Am. 15).*

Amendment 15 to the Atlantic Sea Scallop FMP concluded that as of 2010 there were 347 permitted scallop vessels in the limited access category, 730 in the general category. Mean annual gross sales for vessels in the limited access category are just over $1 million, while for the general category this figure is slightly under $80K. This Amendment concluded that “all permit holders in the sea scallop fishery are considered small business entities” under the SBA criteria.

The statistical areas with the highest catch rates of GB yellowtail flounder are 562 and 525. Should the proposed action force a closure of one or both of these areas on March 1, 2013, it would displace fishing effort to other locations, primarily in the Mid Atlantic region. Because over 75% of revenues from the Atlantic seas scallop fishery come from statistical areas south of Georges Bank, is unclear the degree of impact caused by such a closure, or if the AM would even be triggered. Further, during the baseline period (groundfish FY 2010) less than 1% of total revenues in the scallop fishery came from statistical areas potentially affected by the proposed action (Table 101). Note that there were no access area trips taken in the scallop fishery during this time, and the opening of portions of statistical area 562 to access area trips may (a) increase the probability of triggering the accountability measure and (b) increase the potential for adverse regulatory impacts due to either lost access area trips or displaced fishing effort. The significance of this affect on profitability is likely to be minimal, however. Because all participating vessels are deemed to be small regulated entities there are no disproportional impacts.

Table 101 – Distribution of Atlantic sea scallop fishery revenues across statistical areas during baseline period (*source: NMFS VTR*).

Statistical area	Revenues	*% of total*
512	1,169,321	*0.2%*
514	5,850,352	*1.2%*
515	518,830	*0.1%*
521	41,128,546	*8.4%*
522	2,067,232	*0.4%*
525	4,311,118	*0.9%*
526	58,780,907	*11.9%*
536	1,681,459	*0.3%*
537	1,241,276	*0.3%*
539	1,562,316	*0.3%*
561	8,367,464	*1.7%*
612	63,361,258	*12.9%*
613	33,224,036	*6.7%*
614	1,088,538	*0.2%*
615	90,316,500	*18.3%*
616	30,074,684	*6.1%*
621	40,130,202	*8.2%*
622	26,659,256	*5.4%*
623	695,297	*0.1%*
626	73,538,599	*14.9%*
632	839,250	*0.2%*
OTHER	5,619,057	*1.1%*
Grand total	492,225,499	*100.0%*

8.11.2.2 Economic Impacts of the Proposed Action

The Office of Advocacy at the SBA suggests two criteria to consider in determining the significance of regulatory impacts, namely, disproportional and profitability. The disproportionality criterion compares the effects of the regulatory action on small versus large entities.

Of all affected entities noted herein, only commercial groundfish Sectors are anticipated to be significantly adversely affected. Within this cohort are seven large and ten small entities. The proposed action will significantly reduce short-term profits for regulated small entities relative to the baseline period. Regulated small entities are estimated to be more adversely impacted by the proposed action than large entities (a 63% reduction in gross sales for small, vs. 30% reduction for large). These are short-term impacts, and it is important to note that the reductions in fishing opportunities due to GOM cod and GB yellowtail commercial sub-ACL allocations are necessary to ensure rebuilding of critical groundfish stocks. The ability to lease quota between sectors, and consolidate quota within sectors, will mitigate to some degree the adverse effect on profitability.

However, the proposed action is likely to have significant impact on regulated small entities under the disproportionality criteria. A more detailed treatment of economic impacts may be found in Section 7.4.

8.11.2.3 Economic Impact of Alternatives to the Proposed Action

Two other alternatives to the proposed action were considered. The first, Option 1, represents a no action alternative and would commercial groundfish ACLs as previously proposed in NEMS Framework 45. The second, Option 2(b), contained a significantly higher commercial sub-ACL for GOM cod (23 million lbs, vs. 571K lbs). Both options would have positive economic impacts on regulated small entities in the short term, relative to the baseline period of FY 2010 and the proposed action. Both, however, would lead to overfishing in FY 2012 on the GOM cod stock and are not approvable by the Secretary of Commerce.

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9.0 References

9.1 Glossary

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect: Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation: A group of animals or plants occurring together in a particular location or region.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anaerobic sediment: Sediment characterized by the absence of free oxygen.

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Annual Catch Entitlement (ACE): Pounds of available catch that can be harvested by a particular sector. Based on the total PSC for the permits that join the sector.

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship
S=1-A.

ASPIC (A Surplus Production Model Incorporating Covariates): A non-equilibrium surplus production model developed by Prager (1995). ASPIC was frequently used by the Overfishing Definition Panel to define B_{MSY} and F_{MSY} reference points. The model output was also used to estimate rebuilding timeframes for the Amendment 9 control rules.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g, within the sand or mud found on the bottom. See *Benthic infauna*, below)

Benthic infauna: See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g, coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1^+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

B_{MSY}: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

$B_{threshold}$: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B_{target} as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, $B_{threshold}$ is often defined as either 1/2B_{MSY} or 1/4 B_{MSY}. $B_{threshold}$ is also known as $B_{minimum}$.

B_{target}: A desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1^+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3^+ biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (B_{MSY} or proxy) as a management objective. The biomass threshold ($B_{threshold}$ or B_{min}) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.

Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See *Epifauna*. Animals living upon the bottom that extend a certain distance above the surface.

Epifauna: See *Benthic infauna*. *Epifauna* are animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Exploitation pattern: Describes the fishing mortality at age as a proportion of fully recruited F (full vulnerability to the fishery). Ages that are fully vulnerable experience 100% of the fully recruited F and are termed fully recruited. Ages that are only partially vulnerable experience a fraction of the fully recruited F and are termed partially recruited. Ages that are not vulnerable to the fishery (including discards) experience no mortality and are considered pre-recruits. Also known as the partial recruitment pattern, partial recruitment vector or fishery selectivity.

Exploitation rate (u): The fraction of fish in the exploitable population killed during the year by fishing. This is an annual rate compared to F, which is an instantaneous rate. For example, if a population has 1,000,000 fish large enough to be caught and 550,000 are caught (landed and discarded) then the exploitation rate is 55%.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

$F_{0.1}$: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

F_{MAX}: a fishing mortality rate that maximizes yield per recruit. F_{MAX} is less conservative than $F_{0.1}$.

F_{MSY}: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

$F_{threshold}$: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses F_{MSY} or F_{MSY} proxy for $F_{threshold}$. 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Furrow: A trench in the earth made by a plow; something that resembles the track of a plow, as a marked narrow depression; a groove with raised edges.

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Growth overfishing: Fishing at an exploitation rate or at an age at entry that reduces potential yields from a cohort but does not reduce reproductive output (see recruitment overfishing).

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with *structure-forming organisms*, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush-like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Immobile epifaunal species: See *epifauna*. Animals living on the surface of the bottom substrate that, for the most part, remain in one place.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Land runoff: The part of precipitation, snowmelt, or irrigation water that reaches streams (and thence the sea) by flowing over the ground, or the portion of rain or snow that does not percolate into the ground and is discharged into streams instead.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Lethrinids: Fish of the genus *Lethrinus*, commonly called emperors or nor'west snapper, are found mainly in Australia's northern tropical waters. Distinctive features of Lethrinids include thick lips, robust canine teeth at the front of the jaws, molar-like teeth at the side of the jaws and cheeks without scales. Lethrinids are carnivorous bottom-feeding fish with large, strong jaws.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See *Benthic community* and *Benthic infauna*. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A_{50} is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1^+ mean biomass; mean biomass summed across ages 3 and over is 3^+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L_{25} is the length where 25% of the fish encountered are retained by the mesh. L_{50} is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See *Commensalism*. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including 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.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See *Polychaetes*. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): 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

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Planktivore: An animal that feeds on plankton.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Porosity: The amount of free space in a volume of a material; e.g. the space that is filled by water between sediment particles in a cubic centimeter of seabed sediment.

Possession-limit-only permit: an open-access permit (see above) that restricts the amount of multispecies a vessel may retain (currently 500 pounds of "regulated species").

Potential Sector Contribution (PSC): The percentage of the available catch a limited access permit is entitled to after joining a sector. Based on landings history as defined in Amendment 16. The sum of the PSC's in a sector is multiplied by the groundfish sub-ACL to get the ACE for the sector.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Recovery time: The period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. "Recruitment" also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation: an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Retrospective pattern: A pattern of systematic over-estimation or underestimation of terminal year estimates of stock size, biomass or fishing mortality compared to that estimate for that same year when it occurs in pre-terminal years.

Riverine area: The area of a river and its banks.

Saurids: Fish of the family Scomberesocidae, the sauries or needlefishes. Distribution: tropical and temperate waters.

Scavenging species: An animal that consumes dead organic material.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedentary: See *Motile* and *Mobile organisms*. Not moving. Organisms that spend the majority of their lives in one place.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See *adult stage*. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be “highly” or “moderately” vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats*.

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). B_{MSY} is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, F_{MSY}, B_{MSY}, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Total mortality: The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Trophic guild: Trophic is defined as the feeding level within a system that an organism occupies; e.g., predator, herbivore. A guild is defined as a group of species that exploit the same class of environmental resources in a similar way. The trophic guild is a utilitarian concept covering both structure and organization that exists between the structural categories of trophic groups and species.

Turbidity: Relative water clarity; a measurement of the extent to which light passing through water is reduced due to suspended materials.

Two-bin (displacement) model: a model used to estimate the effects of area closures. This model assumes that effort from the closed areas (first bin) is displaced to the open areas (second bin). The total effort in the system is then applied to the landings-per-unit-effort (LPUE) in open areas to obtain a projected catch. The percent reduction in catch is calculated as a net result.

Vulnerability: In order to evaluate the potential adverse effects of fishing on EFH, the vulnerability of each species EFH was determined. This analysis defines vulnerability as the likelihood that the functional value of EFH would be adversely affected as a result of fishing with different gear types. A number of criteria were considered in the evaluation of the vulnerability of EFH for each life stage including factors like the function of habitat for shelter, food and/or reproduction.

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., Z = F+M)

Zooplankton: See *Phytoplankton*. Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

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9.3 Index

Framework Adjustment 47

to the

Northeast Multispecies FMP

Appendix I

Summary of Past, Present, or Reasonably Foreseeable Future Actions

APPENDIX V

The actions summarized in the table below are presented in chronological order, and codes indicate whether an action relates to the past (P), present (Pr), or reasonably foreseeable future (RFF). When any of these abbreviations occur together, it indicates that some past actions are still relevant to the present and/or future. A brief explanation of the rationale for concluding what effect each action has (or will have) had on each of the VECs is provided in the table and is not repeated here.

Table I-1. Impacts of Past, Present and Reasonably Foreseeable Future Actions on the five VECs. These actions do not include those which were considered to have little impact on the fishery or actions under consideration in this framework.

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS						
[P] Prosecution of the groundfish fisheries by foreign fleets in the area that would become the U.S. EEZ (prior to implementation of the MSA)	Foreign fishing pressure peaked in the 1960s and slowly declined until passage of the MSA in 1974 and implementation of the Multispecies FMP	**Direct High Negative** Foreign fishing depleted many groundfish stocks	**Potentially Direct High Negative** Limited information on discarding, but fishing effort was very high and there were no gear requirements to reduce bycatch	**Potentially Direct High Negative** Limited information on protected resources encounters, but fishing effort was very high	**Potentially Direct High Negative** Limited information on habitat, but fishing effort was very high	**Potentially Indirect Negative** Revenue from fishing was split between foreign and domestic communities, rather than just domestic communities
[P] Original FMP implemented in 1977	Established management of cod, haddock and yellowtail via catch quotas, quota allocations by vessel class and catch limits	**Direct Positive** Provided slight effort reductions and regulatory tools available to rebuild and manage stocks	**Indirect Positive** Reduced directed fishing effort on cod, haddock and yellowtail which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P Interim Plan (1982)	Implemented GB seasonal closed areas, minimum fish size requirements in GB and GOM and permit requirements	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability
P Multispecies Plan (1986)	Revised FMP to include pollock, redfish, winter flounder, American plaice, witch flounder, windowpane flounder and white hake. Allowed additional minimum fish size restrictions, extended GB spawning area closures and a SNE closure to protect yellowtail flounder	**Direct Positive** Reduced directed fishing effort and provided the opportunity to manage additional groundfish species	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P] Amendments 1-4 to the Multispecies FMP (1987-1991)	Implemented closure in SNE/MA to protect yellowtail, extended GB RMA, added minimum mesh size requirements to SNE, excluded scallop dredge vessels from SNE closure, incorporated silver hake, red hake and ocean pout into the FMP	**Direct Positive** Reduced directed fishing effort and provided the opportunity to manage additional groundfish species	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability
[P] Multispecies Emergency Action (1994)	Implemented 500-lb haddock trip limit, expanded CA II closure time and area, prohibited scallop dredge vessels from possessing haddock from Jan-Jun and prohibited pair-trawling for multispecies	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Amendment 5 to the FMP (1994)	Made the above Emergency Action measures permanent, enacted a moratorium on new participants in the fishery, reduced DAS for most vessels by 50% over a 5-7 year period, implemented mandatory reporting and observer requirements, etc.	**Direct High Positive** Reduced directed fishing effort and capped the number of participants allowed to direct on the fishery	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability by limiting the number of participants in the directed fishery. However, there was a negative impact for fishermen and communities where participation was reduced
[P, Pr] Emergency Action (1994)	Implemented additional closed areas, prohibited scallop vessels from fishing in the closed areas, disallowed any fishery using mesh smaller than minimum mesh requirements, prohibited retaining regulated species with small mesh, etc.	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 9 (1985)	Made the above Emergency Action measures permanent	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities
[P, Pr] Amendment 7 to the Multispecies FMP (1996)	Accelerated Amendment 5 DAS reduction schedule, implemented seasonal GOM closures, implemented 1,000 lb haddock trip limit, expanded the 5% bycatch rule, etc.	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 20 (1997)	Implemented GOM cod daily trip limit of 1,000 lb, increased the haddock daily trip limit to 1,000 lb and added gillnet effort-reduction measures such as net limits	**Mixed** Reduced directed fishing effort but allowed for an increase in haddock landings	**Mixed** Gillnet restrictions and reduced effort on cod helped reduce discards/bycatch but this may have been offset by increased effort on haddock	**Indirect Positive** Although the haddock daily trip limit increased, gillnet restrictions provide an overall positive impact	**Mixed** Reduced cod daily trip limit would be offset by increase haddock daily landing limit	**Mixed** Reduced revenues from a smaller cod daily trip limit could be offset by the increased haddock daily landing limit but gillnet effort reductions also have negative eco/soc impacts
[P, Pr] Framework 24 (1998)	Implemented an adjustment to GOM cod daily trip limit by requiring vessels to remain in port and run their DAS clock for a cod overage and implemented the DAS carryover provisions	**Direct Low Positive** Implemented minor effort reductions	**Indirect Low Positive** Implemented minor effort reductions which resulted in minor discard/bycatch reductions	**Indirect Low Positive** Slightly reduced fishing effort, thus reduced interactions with protected species	**Indirect Low Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Vessels must remain in port with their clock running for a cod overage which has a negative impact but vessels may carryover DAS from one fishing year into the next.
[P, Pr] Framework 25 (1998)	Implemented GOM inshore closure areas, the year-round WGOM closure, the CLCA and reduced the GOM cod daily trip limit to 700 lb	**Direct Low Positive** Implemented effort reductions via reduced cod trip limit and closure areas	**Indirect Low Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Closure areas and effort controls reduce gear interactions with habitat	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 26 (1999)	Expansion of April GOM inshore closure area and, additional seasonal inshore GOM and GB area closures	**Direct Low Positive** Implemented effort reductions via closure areas	**Indirect Low Positive** Reduced directed fishing effort which resulted in discard bycatch reductions	**Indirect Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Closure areas and effort controls reduce gear interactions with habitat	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts
[P, Pr, RFF] Amendment 11 (1998)	Designated EFH for all species in the multispecies FMP and required Federal agencies to consult with NMFS on actions that may adversely effect EFH	**Indirect Low Positive** A consultation with NFMS that leads to the protection of multispecies EFH is beneficial to multispecies stocks	**Indirect Low Positive** A consultation with NFMS that leads to the protection of multispecies EFH is beneficial to other stocks that share the same EFH as multispecies stocks	**Indirect Low Positive** Consultation with NFMS that leads to the protection of multispecies EFH is beneficial to protected resources that share a need for the same habitat that multispecies stocks require	**Direct High Positive** Consultation with NMFS on activities that may adversely effect habitat provides NMFS the opportunity to mitigate or even prevent EFH impacts	**Indirect Low Positive** For instances where NMFS consults on projects impacting multispecies EFH, the overall health of the stocks should improve which would lead to long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 27 (1999)	Established large GOM rolling closures, modified CLCA, decreased GOM daily trip limit to 200 lb with subsequent reduction to 30 lb, increased haddock trip limit to 2,000 lb and increased minimum mesh size	**Mixed** Reduced directed fishing effort while also allowing the haddock trip limit to increase	**Mixed** A reduction in directed effort helped minimize bycatch and discards but increased haddock trip limit was somewhat offsetting	**Mixed** Reduced directed effort helps minimize protected species encounters but this was somewhat offset by the increased haddock trip limit	**Indirect Positive** Reduced directed effort and closed areas help improve habitat, this may be slightly offset by the increased haddock trip limit	**Mixed** Short term negative from closed areas and the reduced cod trip limit which were not offset by the increased haddock trip limit. Long term positive because of increased probability of sustainable stocks
[P] Interim Rule (1999)	Revised GOM cod trip limit to 100 lb/day up to 500 lb max and revised the DAS running clock to allow a 1-day overage only	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Low Positive** Effort controls result in reduced interactions with protected species	**Indirect Low Positive** Effort controls result in reduced habitat interactions	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts
[P, Pr, RFF] Amendment 9 (1999)	Prohibited used of brush sweep trawl gear, added halibut to the FMP with a 1-fish per trip possession limit	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Low Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Effort controls result in reduced habitat interactions	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 31 (2000)	Increased GOM Daily limit to 400 lb/day up to 4,000/lb per trip, added Feb GOM inshore closure and extended 1999 Interim Rule running clock measure	**Mixed** Increased cod directed fishing effort while also reducing effort via closure area and cod running clock measure	**Mixed** Increased effort on cod could lead to greater discards/bycatch which would be somewhat offset by effort reductions via closure area and cod running clock measure	**Mixed** Increased cod effort could increase interactions but somewhat offset by effort reductions via closure area and cod running clock measure	**Indirect Low Positive** Minor positive impacts from inshore closure area	**Mixed** Short term positive from increased cod trip limit but long-term sustainability of the cod resource was effected
[P, Pr] Framework 33 (2000)	Added GB seasonal closure area, added conditional GOM closure areas and increase haddock trip limit to 3,000 lb	**Mixed** Increased haddock directed fishing effort while also reducing effort via closure areas	**Mixed** Increased effort on haddock could lead to greater discards/bycatch which would be somewhat offset by effort reductions via closure areas	**Mixed** Increased haddock effort could increase interactions but somewhat offset by effort reductions via closure areas	**Indirect Low Positive** Minor positive impacts from closure areas	**Mixed** Short term positive from increased haddock trip limit but negative impacts resulting from closure areas

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Interim Action (Settlement Agreement; 2002)	Restricted DAS use, modified DAS clock for trip vessels, added year-round closure of CLCA, expanded rolling closures, prohibited front-loading DAS clock, increased GOM trawl and gillnet mesh size, added new limitations on Day gillnets and further restricted charter/party vessels	**Direct High Positive** Implemented substantial directed fishing reductions	**Indirect High Positive** Implemented substantial directed fishing reductions which also reduced discards/bycatch	**Indirect Positive** Fishing reductions and expanded closure areas reduce protected species interactions	**Indirect High Positive** Fishing reductions and expanded closure areas reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but positive regarding the long term sustainability of the fishery

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Interim Action (Settlement Agreement Continued; 2002)	Continued above interim measures, further reduced DAS allocations, prohibited issuance of additional handgear permits, eliminated GOM Jan and Feb closures, increased SNE trawl and GB/SNE gillnet mesh sizes, further limited day and trip gillnets, added longline gear restrictions, added possession limit and restrictions on yellowtail catch and increased GOM cod daily trip limit to 500/4,000 lb max	**Direct High Positive** Implemented substantial directed fishing reductions	**Indirect High Positive** Implemented substantial directed fishing reductions which also reduced discards/bycatch	**Indirect Positive** Fishing reductions reduce protected species interactions	**Indirect Positive** Fishing reductions reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but improving the long term sustainability of the fishery was positive

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Amendment 13 (2004)	Adopted new rebuilding periods and a new rebuilding program that included periodic adjustments and default DAS reductions to reduce effort over time, allowed DAS to be leased or transferred, created sector allocation and special access programs to allow access to stocks that can support an increase in catch	**Direct High Positive** Implemented substantial directed fishing reductions	**Mixed** Implemented substantial directed fishing reductions which also reduced discards/bycatch. However, the mores stringent restrictions created pressure to direct on other stocks (e.g., monkfish)	**Indirect Positive** Fishing reductions reduce protected species interactions	**Indirect Positive** Fishing reductions reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but improving the long term sustainability of the fishery was positive
P, Pr, RFF Framework 40A (2004)	Created additional SAPs to target healthy stocks	**Direct Positive** Directing effort toward healthy stocks relieved pressure on stocks of concern	**Indirect Negative** Increased bycatch of monkfish and skates	**Negligible** Although effort increased slightly, no effort shifts impacting protected species are known to have occurred	**Negligible** Although effort increased slightly, no effort shifts impacting habitat are known to have occurred	**Indirect Positive** Provided vessels the opportunity for greater revenue while relieving pressure on stocks of concern

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 40B (2005)	Relaxed DAS leasing and transfer requirements, created new yellowtail flounder SAP, provided greater opportunity for vessels to participate in the GB Cod Hook Sector, removed the net trip limit for gillnets, etc.	**Negligible** Mix of alternatives, some of which slightly increased effort and others that slightly decreased effort. Overall, changes did not threaten rebuilding targets established by Amendment 13	**Indirect Low Negative** Mix of alternatives that primarily had little impact on discards/bycatch with the exception of removing the net trip limit for gillnets which increased monkfish effort	**Negligible** Slight effort changes did not have measurable impacts to protected species	**Negligible** Slight effort changes did not have measurable impacts to habitat	**Indirect Low Positive** Slight changes to the leasing and transfer programs along with greater opportunities to participate in SAPs provides an opportunity for greater revenue
P, Pr, RFF Framework 41 (2005)	Allowed for participation in the Hook Gear Haddock SAP by non-Sector vessels	**Direct Low Positive** Encouraged effort on haddock, a healthy stock, and thus away from other stocks of concern	**Indirect Low Negative** Although directed effort shifted to a healthier stock, there was an overall effort increase resulting in a greater opportunity for bycatch/discards	**Negligible** Slight effort changes did not have measurable impacts to protected species	**Negligible** Slight effort changes did not have measurable impacts to habitat	**Indirect Low Positive** Greater opportunity to fish for a healthy stock provides increased revenue

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
P Emergency Action (2006)	Implemented differential A DAS of 1.4:1, restricted the B Regular DAS program and US/CA Haddock SAP and reduced trip limits on cod, yellowtail, etc.	**Direct High Positive** Implemented effort reductions that anticipated achieving mortality reductions needed to keep stocks on track to rebuild	**Mixed** Effort reductions lead to reduced discards/bycatch but the B Regular DAS program increased monkfish and skate bycatch	**Negligible** Effort changes did not have measurable impacts to protected species	**Negligible** Effort changes did not have more than minimal impacts to habitat	**Mix** Short term effort reductions have a negative impact on revenues but increase long term sustainability of stocks
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 42 (2006)	Reduced the number of A DAS available, modified differential DAS counting to 2:1 in the GOM and SNE, reduced trip limits for several stocks, increased recreations minimum fish sizes, required use of VMS by all vessels, modified the SAPs, limited the bycatch of monkfish and skates for vessels using a haddock separator trawl, etc.	**Direct High Positive** Implemented effort reductions that anticipated achieving mortality reductions needed to keep stocks on track to rebuild	**Indirect Positive** Effort reductions lead to reduced discards/bycatch and measures were implemented to control monkfish and skate bycatch	**Indirect Low Positive** Overall effort reductions have a positive impact, particularly to protected species in high use areas such as the GOM and SNE where strict differential counting rules are in effect	**Indirect Low Positive** Overall effort reductions have a positive impact	**Mixed** Effort reductions have a significant negative impact to vessel owners and communities, primarily due to loss of revenues. Over the long term however, stocks should remain sustainable

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 43 (2006)	Established a haddock incidental bycatch limit in the herring fishery on GB	**Mixed** While the incidental haddock allowance allows some legal catch of haddock which has a negative impact, the area is closed after the bycatch cap is reached which prohibits further harvest (positive impact)	**Negligible** The herring fishery is fairly clean and the increased haddock bycatch problem arose from strong 2003 and 2004 year classes. Allowing legal retention of haddock bycatch should not alter fishing practices in a manner that would impact species taken as bycatch	**Negligible** Although attaining the bycatch cap could reduce effort on GB, the extent of this reduction was not expected to have an overall impact on protected species	**Negligible** Gear used to target herring have been found not to have an impact on habitat	**Mixed** Allowing herring vessels to continue fishing practices on GB has a positive impact on those vessels and communities. However, the loss of the potential haddock catch has a negative impact on fishermen targeting groundfish
P, P, RFF Amendment 16 (2010)	Modified rebuilding mortality targets and status determination criteria, adopted ACL/AM requirements, modified effort controls, expanded sector policies, implemented 17 additional sectors, modified SAPs, changed DAS leasing and transfer programs	**Direct High Positive** Suite of measures reduces fishing mortality on groundfish stocks to continue rebuilding	**Indirect Positive** Reduced effort from common-pool and sector measures expected to reduce discards of non-target species	**Indirect Low Positive** If common pool and sector measures reduce overall groundfish fishing effort, this will likely reduce protected species impacts	**Direct Low Positive** Fishing effort reductions from common pool and sector measures should reduce interactions with EFH	**Mixed** Combination of effort controls and sector measures likely to reduce number of vessels, crew, communities participating in fishery, but remaining participants may be more profitable

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 44 (2010)	Specified OFLs/ABC/ACLs for groundfish, FY 2010-2012; authorized in-season adjustments for common pool vessels; adopted YTF allocations for scallop fishery	**Positive** Established catch limits consistent with mortality targets and measures to insure targets are not exceeded	**No impact/neutral**	**Mixed** YTF allocations may reduce scallop effort if they limit fishery, reduce interactions with protected species	**Negligible**	**Minor/Mixed** Revenues should increase over time but short term losses expected
P, Pr, RFF Framework 45 (2011)	Adopted minor modifications to sector program, revised specifications for some stocks and effort control measures including a cod spawning protection area	**Positive** Continue stock rebuilding	**Negligible**	**Negligible** Analysis not complete but minimal impacts expected	**Negligible** Analysis not complete but minimal impacts expected	**Minor/Mixed** Revenues should increase over time but short term losses expected
P, Pr, RFF Framework 46 (2011)	Modified portion of GB and GOM haddock ACL that can be caught by the herring fishery	**Negligible** Did not modify overall catch limits	**Negligible** Should not alter fishing practices in a manner that would impact species taken as bycatch	**Negligible** A possible slight increase in herring fishing was not expected to have an overall impact on protected species	**Negligible** Gear used to target herring have been found not to have an impact on habitat	**Mixed** Allowing herring vessels to continue fishing has a positive impact on that fishery. However, loss of potential haddock catch has a negative impact on fishermen targeting groundfish

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr, RFF] Sector EAs (Annually 2010-)	Sector EAs are prepared for each sector approved under the FMP. These documents assess impacts from exemptions granted to individual sectors that go beyond the universal exemptions	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Low Positive** Because one of the intents of sectors is to provide participants greater freedom to maximize their operations, revenues would be expected to be slightly higher
[Pr, RFF] Amendment 17 (2011)	Established the operation of NOAA-sponsored, state-operated permit banks	**Negligible** Action not considered to have any impacts beyond those anticipated by Amendment 16	**Negligible** Action not considered to have any impacts beyond those anticipated by Amendment 16	**Negligible** Action not considered to have any impacts beyond those anticipated by Amendment 16	**Negligible** Action not considered to have any impacts beyond those anticipated by Amendment 16	**Negligible** Action not considered to have any impacts beyond those anticipated by Amendment 16
[RFF] Amendment 18 (In development)	Consider accumulation limits and measures to maintain fleet diversity	**Negligible** Will not change total groundfish catch	**Minor/Mixed** Will not change total catch but could conceivably divert effort into other fisheries	**Minor** May change types and locations of fishing activity	**Minor** May change distribution of catch by gears used in the fishery	**Mixed** While some communities may support ownership caps or other measures to maintain fleet diversity, others my view this as an inefficient way to manage

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
OTHER FISHERY-RELATED ACTIONS						
[P] Prosecution of herring fisheries by foreign fleets in the area that would become the U.S. EEZ (prior to implementation of the M-S Act)	Foreign fishing pressure peaked in the 1960s and slowly declined until passage of the M-S Act and implementation of the FMP	**Negative** – high bycatch and fishing mortality rates	**High Negative** – declining population and crash on Georges Bank	**Potentially Negative** - given high bycatch in DWF mackerel and squid fisheries	**Low Negative** – unknown impacts from foreign fishing practices	**Low Negative** – value from fishery cycling to foreign businesses
[P, Pr] Interstate FMP beginning in 1983 and ASMFC Atlantic Herring FMP in 1993, ASMFC FMP actions in 1998 and 2000	Management in state waters; Address growth in the fishery, allocate IWP; Define overfishing, estimate MSY, spawning closures, days out; Redefine spawning areas, impose landing restriction from spawning areas	**Neutral**	**Positive** – establish management in State waters to ease overfishing pressure and rebuild stock	**Low Positive** – limited fishing effort	**Positive**	**Positive** – establish IWP, more available to local economies
[P, Pr, RFF] Atlantic Sea Scallop FMP – a series of amendment and framework actions from the mid-1990s through the present	Implementation of the Atlantic Sea Scallop FMP and continued management of the fishery, primarily through effort controls	**Direct Positive** Effort reductions taken over time have resulted in a sustainable scallop fishery	**Indirect Positive** Effort reductions taken over time also reduced bycatch, including gear modifications that improved bycatch escapement	**Mixed** Effort reductions taken over time reduced interactions with protected species however, turtle interactions remain problematic	**Indirect Positive** Effort reductions reduced gear contact with habitat and the current rotational access program focuses fishing effort on sandy substrates which are less susceptible to habitat impacts	**Indirect Positive** Initial negative impacts due to effort reductions have been supplanted by a sustainable, profitable fishery

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
OTHER FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Monkfish FMP – a series of amendment and framework actions from implementation of the FMP in 1999 through the present	Implementation of the monkfish FMP and continued management of the fishery, primarily through effort controls	**Direct Positive** Effort reductions have resulted in a fishery that is no longer overfished, nor is overfishing occurring	**Indirect Positive** Effort reductions taken over time also reduced bycatch	**Indirect Positive** Reducing effort reduced opportunities for interactions with protected species	**Indirect Positive** Reducing effort reduced opportunities for habitat interactions	**Indirect Positive** Reducing effort has created a sustainable fishery
P,P,RFF NEFMC Atlantic Herring FMP and subsequent amendments	Establish TACs, management areas, reporting requirements, permits, complement state management	Low Positive – reduced bycatch	**Positive** – establish complementary Federal management to protect stock	**Positive** – established overall TAC and area TACs	**Low Positive** – limit fishing effort	**Neutral** – support local economies, but limit catch with TAC
Pr, RFF Large Whale Take Reduction Plan Amendment (2008)	Removed the DAM program, implement sinking ground lines for lobster gear, includes more trap/pot and gillnet fisheries under the protection plan and requires additional markings on gear to improve information on where and how entanglements occur	**Negligible** Changes implemented through the amendment are not expected to have substantial changes on groundfish	**Negligible** Changes implemented through the amendment are not expected to have substantial changes on non-groundfish species	**Direct Positive** New regulations implemented to protect large whales are expected to have a positive impact on large whales by reducing incidental takes	**Negligible** Changes implemented through the amendment are not expected to have substantial changes to habitat	**Indirect Negative** Changes implemented through the amendment require some gear changes for gillnet fisheries which have minor negative economic impacts

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
OTHER FISHERY-RELATED ACTIONS CONTINUED						
RFF Harbor Porpoise Take Reduction Plan Amendment (~2010)	Options are currently under development to reduce takes of harbor porpoise toward the long-term zero mortality rate goal	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact groundfish	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact non-groundfish species	**Direct Positive** Changes to protect harbor porpoise have a positive impact on protected species	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact habitat	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact human communities
RFF Essential Fish Habitat Omnibus Amendment (~2010/2011)	This amendment would revised EFH designations for all New England fisheries, possibly establish new HAPCs and consider measures to further protect critical habitat; may revise multispecies closed areas	**Unknown** If new measures are implemented to protect habitat, they would likely have a positive impact on groundfish	**Unknown** If new measures are implemented to protect habitat, they could have a positive impact non-groundfish species	**Unknown** If new measures are implemented to protect habitat, they could potentially impact protected species	**Direct Positive** New measures implemented to protect habitat would have a positive impact on habitat	**Unknown** If new measures are implemented to protect habitat, they would likely impact human communities
P, Pr RFF Amendment 3 to the Skate FMP (2010)	This amendment addresses rebuilding of winter and thorny skates and reduce mortality on little and smooth skates; reduces trip limits, adopts ACLs and AMs	**Minor Negative** Lower skate possession limits and closures may cause vessels to use DAS for groundfish	**Mixed** Actions taken to reduce skate mortality; they could lead to increased targeting of non-groundfish species	**Unknown** If actions are taken to reduce skate mortality, they could impact protected species	**Unknown** If actions are taken to reduce skate mortality, they could impact habitat	**Minor negative** Actions taken to reduce skate mortality negatively impact human communities

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
NON FISHERY-RELATED ACTIONS						
P, Pr, RFF Agriculture runoff	Nutrients applied to agriculture land are introduced into aquatic systems	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability and can lead to reduced income from fishery resources
P, Pr, RFF Port maintenance	Dredging of wetlands, coastal, port and harbor areas for port maintenance	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area
P, Pr, RFF Offshore disposal of dredged materials	Disposal of dredged materials	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
NON FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Beach nourishment	Offshore mining of sand for beaches	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for mining companies, possibly negative for fisheries
	Placement of sand to nourish beach shorelines	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Positive** Improves beaches and can help protect homes along the shore line
P, Pr, RFF Marine transportation	Expansion of port facilities, vessel operations and recreational marinas	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for some interests, potential displacement for others
P, Pr, RFF Installation of pipelines, utility lines and cables	Transportation of oil, gas and energy through pipelines, utility lines and cables	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Initially reduced habitat quality in the immediate project area	**Mixed** End users benefit from improved pipelines, cables, etc., but reduced habitat quality may impact fisheries and revenues

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
NON FISHERY-RELATED ACTIONS CONTINUED						
Pr, RFF Liquefied Natural Gas (LNG) terminals (w/in 5 years)	Transportation of natural gas via tanker to terminals located offshore and onshore (Several LNG terminals are proposed, including ME, MA, NY, NJ and MD)	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Mixed** End users benefit from a steady supply of natural gas but reduced habitat quality may impact fisheries and revenues
RFF Offshore Wind Energy Facilities (w/in 5 years)	Construction of wind turbines to harness electrical power (Several facilities proposed from ME through NC, including off the coast of MA)	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Mixed** End users benefit from a clean energy production but reduced habitat quality may impact fisheries and revenues

Framework Adjustment 47

to the

Northeast Multispecies FMP

Appendix II

Summary of Catch by Sector and Common Pool, FY 2010

Data Information:

These data are the best available to NOAA's National Marine Fisheries Service (NMFS). Data sources for this report include: (1) Vessels via VMS; (2) Vessels via vessel logbook reports; (3) Dealers via Dealer Electronic reporting. Values are in live weight and include estimates of missing dealer reports. Differences with previous reports are due to corrections made to the database.

Source: NMFS Northeast Regional Office

Run Date: June 29, 2011

Any value for a non-allocated species may be due to landings of that stock; misreporting of species and/or stock area; and/or estimated landings (in lieu of missing reports) based on vessel histories.

Table 1 – Total Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	SIMM sub-ACLs*		Catch			Comparison of Catch and Final ACE						
Stock	Initial	Final	Landings	Discards^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover ** lbs	Remaindered ACE lbs	Remaindered ACE mt	% of ACE_{Final}
GB Cod East	717,441	717,441	524,611	34,224	558,835	158,606	77.9	NA	NA	NA	NA	NA
GB Cod West	6,563,099	6,563,099	5,268,581	225,959	5,494,540	1,068,559	83.7	728,054	699,321	369,239	167.5	5.6
GB Cod	7,280,541	7,280,541	5,793,192	260,183	6,053,375	1,227,166	83.1	728,054	699,321	527,845	239.4	7.3
GOM Cod	9,540,389	9,540,389	7,798,075	176,209	7,974,284	1,566,105	83.6	954,039	949,413	616,691	279.7	6.5
GB Haddock East	26,262,695	26,262,695	3,981,619	37,677	4,019,295	22,243,400	15.3	NA	NA	NA	NA	NA
GB Haddock West	62,331,182	62,331,182	14,112,632	51,770	14,164,402	48,166,780	22.7	8,859,388	8,859,388	39,307,392	17,829.5	63.1
GB Haddock	88,593,877	88,593,877	18,094,251	89,447	18,183,697	70,410,180	20.5	8,859,388	8,859,388	61,550,792	27,919.0	69.5
GOM Haddock	1,761,206	1,761,206	810,886	5,983	816,869	944,337	46.4	176,121	173,501	770,836	349.6	43.8
GB Yellowtail Flounder	1,770,451	1,770,451	1,482,255	146,998	1,629,253	141,197	92.0	NA	NA	NA	NA	NA
SNE Yellowtail	517,372	517,372	325,947	10,178	336,125	181,247	65.0	51,737	51,603	129,644	58.8	25.1
CC/GOM Yellowtail Flounder	1,608,084	1,608,084	1,102,512	131,563	1,234,074	374,010	76.7	160,808	155,812	218,197	99.0	13.6
Plaice	6,058,149	6,058,149	2,936,355	378,707	3,315,063	2,743,086	54.7	605,815	605,815	2,137,271	969.4	35.3
Witch Flounder	1,824,125	1,824,125	1,406,928	126,098	1,533,027	291,099	84.0	182,413	177,788	113,311	51.4	6.2
GB Winter Flounder	4,018,496	4,018,496	3,008,362	39,364	3,047,725	970,770	75.8	401,850	401,850	568,921	258.1	14.2
GOM Winter Flounder	293,736	293,736	174,458	3,476	177,934	115,802	60.6	29,374	27,953	87,849	39.8	29.9
SNE Winter Flounder	NA	NA	17,462	75,700	93,163	NA	NA	NA	NA	NA	NA	NA
Redfish	14,894,618	14,894,618	4,390,655	334,602	4,725,257	10,169,361	31.7	1,489,462	1,489,462	8,679,899	3,937.1	58.3
White Hake	5,522,677	5,522,677	4,815,110	69,520	4,884,630	638,047	88.4	552,268	544,996	93,052	42.2	1.7
Pollock	35,666,741	35,666,741	11,842,183	172,585	12,014,768	23,651,973	33.7	3,566,674	3,566,674	20,085,299	9,110.5	56.3
Northern Windowpane	NA	NA	627	333,733	334,360	NA	NA	NA	NA	NA	NA	NA
Southern Windowpane	NA	NA	271	115,977	116,248	NA	NA	NA	NA	NA	NA	NA
Ocean Pout	NA	NA	123	124,397	124,520	NA	NA	NA	NA	NA	NA	NA
Halibut	NA	NA	13,415	43,004	56,419	NA	NA	NA	NA	NA	NA	NA
Wolfish	NA	NA	523	41,152	41,675	NA	NA	NA	NA	NA	NA	NA

*Does not equal sum of Sector ACEs due to rounding error
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 2 – Fixed Gear Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	ACE		Trades	Catch			Comparison of Catch and Final ACE				
Stock	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	208,721	248,928	40,207	174,099	13,421	187,520	61,408	75.3	NA	NA	
GB Cod West	1,909,369	640,343	-1,269,026	454,535	37,616	492,152	148,191	76.9	211,809	209,599	
GB Cod	2,118,090	889,271	-1,228,819	628,635	51,037	679,672	209,599	76.4	211,809	209,599	0
GOM Cod	190,837	388,087	197,250	303,482	29,254	332,735	55,352	85.7	19,084	19,084	36,268
GB Haddock East	1,692,687	1,577,841	-114,846	311,731	8,159	319,890	1,257,951	20.3	NA	NA	
GB Haddock West	4,017,379	3,760,379	-257,000	442,162	8,606	450,768	3,309,611	12.0	571,007	571,007	
GB Haddock	5,710,066	5,338,220	-371,846	753,893	16,765	770,658	4,567,562	14.4	571,007	571,007	3,996,555
GOM Haddock	23,383	68,383	45,000	44,660	9	44,669	23,714	65.3	2,338	2,338	21,376
GB Yellowtail Flounder	232	536	304	99	13	111	425	20.8	NA	NA	
SNE Yellowtail	1,259	1,259	0	0	26	26	1,234	2.1	126	126	1,108
CC/GOM Yellowtail Flounder	31,297	8,967	-22,330	1,116	676	1,792	7,175	20.0	3,130	3,130	4,045
Plaice	34,673	10,173	-24,500	640	398	1,039	9,134	10.2	3,467	3,467	5,667
Witch Flounder	14,933	1,865	-13,068	370	79	449	1,416	24.1	1,493	1,416	0
GB Winter Flounder	1,090	1,509	419	962	63	1,025	484	67.9	109	109	375
GOM Winter Flounder	7,777	4,777	-3,000	235	34	269	4,509	5.6	778	778	3,731
SNE Winter Flounder	NA	NA	NA	16	6,359	6,375	NA	NA	NA	NA	
Redfish	436,270	398,270	-38,000	24,579	283	24,862	373,408	6.2	43,627	43,627	329,781
White Hake	331,691	81,891	-249,800	49,593	5,596	55,189	26,702	67.4	33,169	26,702	0
Pollock	2,843,180	2,184,180	-659,000	326,130	26,320	352,449	1,831,730	16.1	284,318	284,318	1,547,412
Northern Windowpane	NA	NA	NA	24	778	802	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	54	54	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	50	2,407	2,457	NA	NA	NA	NA	
Halibut	NA	NA	NA	574	1,193	1,767	NA	NA	NA	NA	
Wolfish	NA	NA	NA	14	4,994	5,008	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 3 – Northeast Coastal Communities Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	ACE		Trades	Catch			Comparison of Catch and Final ACE				
Stock	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	1,174	91	-1,083	0	0	0	91	0.0	NA	NA	
GB Cod West	10,738	823	-9,915	4	0	4	819	0.5	1,191	910	
GB Cod	11,912	914	-10,998	4	0	4	910	0.4	1,191	910	0
GOM Cod	46,100	10,373	-35,727	5,937	265	6,202	4,171	59.8	4,610	4,171	0
GB Haddock East	31,955	31,955	0	0	0	0	31,955	0.0	NA	NA	
GB Haddock West	75,842	75,842	0	0	0	0	75,842	0.0	10,780	10,780	
GB Haddock	107,797	107,797	0	0	0	0	107,797	0.0	10,780	10,780	97,018
GOM Haddock	4,098	3,498	-600	483	33	516	2,983	14.7	410	410	2,573
GB Yellowtail Flounder	15,191	15,191	0	0	0	0	15,191	0.0	NA	NA	
SNE Yellowtail	3,597	3,597	0	0	0	0	3,597	0.0	360	360	3,237
CC/GOM Yellowtail Flounder	6,871	6,871	0	0	0	0	6,871	0.0	687	687	6,184
Plaice	8,580	5,520	-3,060	1	0	1	5,519	0.0	858	858	4,661
Witch Flounder	3,908	393	-3,515	0	0	0	393	0.0	391	391	2
GB Winter Flounder	2,805	2,805	0	0	0	0	2,805	0.0	281	281	2,525
GOM Winter Flounder	929	929	0	0	0	0	929	0.0	93	93	836
SNE Winter Flounder	NA	NA	NA	8	0	8	NA	NA	NA	NA	
Redfish	66,961	66,961	0	12	2	14	66,947	0.0	6,696	6,696	60,251
White Hake	48,511	4,867	-43,644	635	74	710	4,157	14.6	4,851	4,157	0
Pollock	161,843	148,801	-13,042	0	1	1	148,800	0.0	16,184	16,184	132,616
Northern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Halibut	NA	NA	NA	270	2,070	2,340	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	134	134	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE

^ Discards include both observed and calculated discards

** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 4 – NEFS II FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	ACE		Trades	Catch	Comparison of Catch and Final ACE						
Stock	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	39,659	52,493	12,834	48,716	1,918	50,635	1,858	96.5	NA	NA	
GB Cod West	362,798	945,931	583,133	803,634	14,597	818,231	127,700	86.5	40,246	40,246	
GB Cod	402,457	998,424	595,967	852,350	16,515	868,866	129,558	87.0	40,246	40,246	89,312
GOM Cod	1,917,357	2,703,234	785,877	2,212,600	53,596	2,266,197	437,038	83.8	191,736	191,736	245,302
GB Haddock East	3,072,445	3,340,803	268,358	631,057	3,264	634,320	2,706,483	19.0	NA	NA	
GB Haddock West	7,292,059	7,460,762	168,703	1,620,568	935	1,621,503	5,839,259	21.7	1,036,450	1,036,450	
GB Haddock	10,364,504	10,801,565	437,061	2,251,625	4,199	2,255,824	8,545,741	20.9	1,036,450	1,036,450	7,509,291
GOM Haddock	321,574	516,796	195,222	307,348	906	308,253	208,543	59.6	32,157	32,157	176,385
GB Yellowtail Flounder	30,787	55,844	25,057	29,343	9,942	39,285	16,559	70.3	NA	NA	
SNE Yellowtail	11,460	1,146	-10,314	0	0	0	1,146	0.0	1,146	1,146	0
CC/GOM Yellowtail Flounder	327,564	457,066	129,502	313,069	72,777	385,845	71,221	84.4	32,756	32,756	38,465
Plaice	517,134	801,799	284,665	301,267	59,087	360,354	441,445	44.9	51,713	51,713	389,732
Witch Flounder	247,574	312,200	64,626	247,419	17,452	264,872	47,328	84.8	24,757	24,757	22,571
GB Winter Flounder	69,069	85,106	16,037	21,220	1,808	23,028	62,078	27.1	6,907	6,907	55,171
GOM Winter Flounder	68,090	91,980	23,890	68,413	1,941	70,354	21,626	76.5	6,809	6,809	14,817
SNE Winter Flounder	NA	NA	NA	144	836	980	NA	NA	NA	NA	
Redfish	2,494,479	3,181,194	686,715	956,281	128,861	1,085,142	2,096,052	34.1	249,448	249,448	1,846,604
White Hake	345,144	454,024	108,880	416,404	3,104	419,508	34,515	92.4	34,514	34,514	1
Pollock	4,484,994	5,696,920	1,211,926	2,003,080	13,418	2,016,498	3,680,422	35.4	448,499	448,499	3,231,922
Northern Windowpane	NA	NA	NA	30	25,253	25,283	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	4,025	4,025	NA	NA	NA	NA	
Halibut	NA	NA	NA	1,004	7,770	8,774	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	9,649	9,649	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 5 – NEFS III FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	ACE		Trades	Catch			Comparison of Catch and Final ACE				
Stock	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	7,075	1,314	-5,761	0	0	0	1,314	0.0	NA	NA	
GB Cod West	64,720	20,130	-44,590	1,991	1,189	3,181	16,949	15.8	7,179	7,179	
GB Cod	71,795	21,444	-50,351	1,991	1,189	3,181	18,263	14.8	7,179	7,179	11,084
GOM Cod	1,600,839	1,946,216	345,377	1,677,064	30,459	1,707,523	238,693	87.7	160,084	160,084	78,609
GB Haddock East	42,403	42,236	-167	0	0	0	42,236	0.0	NA	NA	
GB Haddock West	100,639	100,013	-626	116	85	202	99,811	0.2	14,304	14,304	
GB Haddock	143,042	142,249	-793	116	85	202	142,048	0.1	14,304	14,304	127,743
GOM Haddock	196,856	351,605	154,749	143,724	1,319	145,042	206,562	41.3	19,686	19,686	186,877
GB Yellowtail Flounder	817	2,214	1,397	0	0	0	2,214	0.0	NA	NA	
SNE Yellowtail	428	425	-3	0	126	126	299	29.7	43	43	256
CC/GOM Yellowtail Flounder	141,881	198,397	56,516	146,379	14,649	161,027	37,370	81.2	14,188	14,188	23,182
Plaice	269,450	186,882	-82,568	5,877	1,507	7,384	179,499	4.0	26,945	26,945	152,554
Witch Flounder	55,658	34,767	-20,891	17,445	75	17,520	17,246	50.4	5,566	5,566	11,680
GB Winter Flounder	750	1,289	539	0	0	0	1,289	0.0	75	75	1,214
GOM Winter Flounder	34,647	49,542	14,895	33,976	370	34,346	15,197	69.3	3,465	3,465	11,732
SNE Winter Flounder	NA	NA	NA	1	16	17	NA	NA	NA	NA	
Redfish	219,381	217,580	-1,801	2,560	399	2,959	214,621	1.4	21,938	21,938	192,683
White Hake	285,042	112,386	-172,656	83,126	723	83,850	28,537	74.6	28,504	28,504	33
Pollock	2,685,694	2,945,334	259,640	538,060	7,621	545,681	2,399,653	18.5	268,569	268,569	2,131,084
Northern Windowpane	NA	NA	NA	30	718	748	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	291	291	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	661	661	NA	NA	NA	NA	
Halibut	NA	NA	NA	603	1,797	2,400	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	3,868	3,868	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE

^ Discards include both observed and calculated discards

** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 6 – NEFS IV FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	35,100	5,681	-29,419	0	0	0	5,681	0.0	NA	NA	
GB Cod West	321,097	37,144	-283,953	0	0	0	37,144	0.0	35,620	35,620	
GB Cod	356,197	42,825	-313,372	0	0	0	42,825	0.0	35,620	35,620	7,205
GOM Cod	867,905	87,794	-780,111	0	0	0	87,794	0.0	86,791	86,791	1,004
GB Haddock East	1,433,073	1,117,825	-315,248	0	0	0	1,117,825	0.0	NA	NA	
GB Haddock West	3,401,216	3,118,197	-283,019	0	0	0	3,118,197	0.0	483,429	483,429	
GB Haddock	4,834,289	4,236,022	-598,267	0	0	0	4,236,022	0.0	483,429	483,429	3,752,593
GOM Haddock	121,520	11,430	-110,090	0	0	0	11,430	0.0	12,152	11,430	0
GB Yellowtail Flounder	39,212	3,830	-35,382	0	0	0	3,830	0.0	NA	NA	
SNE Yellowtail	18,336	4,020	-14,316	0	0	0	4,020	0.0	1,834	1,834	2,186
CC/GOM Yellowtail Flounder	123,287	17,630	-105,657	0	0	0	17,630	0.0	12,329	12,329	5,301
Plaice	578,845	231,158	-347,687	0	0	0	231,158	0.0	57,885	57,885	173,274
Witch Flounder	174,050	28,605	-145,445	0	0	0	28,605	0.0	17,405	17,405	11,200
GB Winter Flounder	29,005	4,368	-24,637	0	0	0	4,368	0.0	2,900	2,900	1,467
GOM Winter Flounder	26,477	1,748	-24,729	0	0	0	1,748	0.0	2,648	1,748	0
SNE Winter Flounder	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Redfish	974,175	223,390	-750,785	0	0	0	223,390	0.0	97,417	97,417	125,972
White Hake	446,241	45,430	-400,811	0	0	0	45,430	0.0	44,624	44,624	806
Pollock	2,059,277	792,478	-1,266,799	0	0	0	792,478	0.0	205,928	205,928	586,550
Northern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Halibut	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	0	0	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 7 – NEFS V FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	20,906	2,205	-18,701	1,444	163	1,607	599	72.8	NA	NA	
GB Cod West	191,251	326,012	134,761	250,031	26,263	276,294	49,718	84.7	21,216	21,216	
GB Cod	212,157	328,217	116,060	251,474	26,426	277,900	50,317	84.7	21,216	21,216	29,101
GOM Cod	23,090	2,313	-20,777	0	5	5	2,308	0.2	2,309	2,308	0
GB Haddock East	1,403,821	1,390,041	-13,780	9,567	429	9,995	1,380,046	0.7	NA	NA	
GB Haddock West	3,331,791	3,262,017	-69,774	662,117	2,960	665,077	2,596,940	20.4	473,561	473,561	
GB Haddock	4,735,612	4,652,058	-83,554	671,683	3,389	675,072	3,976,986	14.5	473,561	473,561	3,503,425
GOM Haddock	12,201	6,643	-5,558	0	0	0	6,643	0.0	1,220	1,220	5,423
GB Yellowtail Flounder	173,157	129,636	-43,521	115,767	8,763	124,530	5,106	96.1	NA	NA	
SNE Yellowtail	181,232	208,058	26,826	160,800	3,677	164,478	43,581	79.1	18,123	18,123	25,457
CC/GOM Yellowtail Flounder	27,165	2,929	-24,236	0	25	25	2,905	0.8	2,717	2,717	188
Plaice	129,802	121,602	-8,200	23,624	1,680	25,304	96,298	20.8	12,980	12,980	83,317
Witch Flounder	47,301	40,501	-6,800	18,478	1,899	20,377	20,124	50.3	4,730	4,730	15,394
GB Winter Flounder	104,147	102,902	-1,245	57,953	526	58,479	44,422	56.8	10,415	10,415	34,008
GOM Winter Flounder	2,345	280	-2,065	0	0	0	280	0.1	235	235	46
SNE Winter Flounder	NA	NA	NA	3,281	31,289	34,570	NA	NA	NA	NA	
Redfish	61,649	54,453	-7,196	950	86	1,036	53,417	1.9	6,165	6,165	47,252
White Hake	20,215	5,371	-14,844	2,839	510	3,349	2,021	62.4	2,021	2,021	0
Pollock	148,928	144,194	-4,734	2,212	20	2,232	141,962	1.5	14,893	14,893	127,069
Northern Windowpane	NA	NA	NA	400	20,057	20,457	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	214	67,123	67,337	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	13,768	13,768	NA	NA	NA	NA	
Halibut	NA	NA	NA	167	49	216	NA	NA	NA	NA	
Wolfish	NA	NA	NA	6	0	6	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 8 – NEFS VI FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	13,950	11,362	-2,588	6,420	533	6,953	4,409	61.2	NA	NA	
GB Cod West	127,615	328,262	200,647	310,619	1,988	312,607	15,655	95.2	14,157	14,157	
GB Cod	141,565	339,624	198,059	317,039	2,521	319,560	20,064	94.1	14,157	14,157	5,908
GOM Cod	170,012	221,158	51,146	197,852	994	198,845	22,313	89.9	17,001	17,001	5,312
GB Haddock East	706,942	1,002,808	295,866	87,371	1,402	88,773	914,035	8.9	NA	NA	
GB Haddock West	1,677,838	2,380,040	702,202	95,739	15	95,754	2,284,286	4.0	238,478	238,478	
GB Haddock	2,384,781	3,382,849	998,068	183,110	1,417	184,527	3,198,322	5.5	238,478	238,478	2,959,844
GOM Haddock	53,817	68,441	14,624	11,867	4	11,871	56,570	17.3	5,382	5,382	51,188
GB Yellowtail Flounder	24,320	19,657	-4,663	13,601	1,858	15,459	4,197	78.6	NA	NA	
SNE Yellowtail	33,138	16,572	-16,566	5,413	18	5,431	11,141	32.8	3,314	3,314	7,827
CC/GOM Yellowtail Flounder	35,289	54,100	18,811	47,013	1,647	48,660	5,439	89.9	3,529	3,529	1,911
Plaice	212,976	355,807	142,831	273,832	25,750	299,582	56,225	84.2	21,298	21,298	34,928
Witch Flounder	78,277	156,456	78,179	143,306	4,813	148,119	8,337	94.7	7,828	7,828	509
GB Winter Flounder	34,349	23,447	-10,902	7,967	103	8,071	15,376	34.4	3,435	3,435	11,941
GOM Winter Flounder	11,391	12,904	1,513	10,607	135	10,742	2,161	83.2	1,139	1,139	1,022
SNE Winter Flounder	NA	NA	NA	945	83	1,028	NA	NA	NA	NA	
Redfish	785,040	1,028,215	243,175	668,275	5,669	673,944	354,270	65.5	78,504	78,504	275,766
White Hake	205,772	303,461	97,689	277,982	290	278,273	25,189	91.7	20,577	20,577	4,611
Pollock	1,167,019	1,601,459	434,440	705,148	3,664	708,812	892,647	44.3	116,702	116,702	775,945
Northern Windowpane	NA	NA	NA	0	923	923	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	59	59	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	7,170	7,170	NA	NA	NA	NA	
Halibut	NA	NA	NA	329	1,262	1,591	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	646	646	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 9 – NEFS VII FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	44,807	21,395	-23,412	21,160	237	21,396	-1	100.0	NA	NA	
GB Cod West	409,889	343,181	-66,708	306,481	7,395	313,875	29,306	91.5	45,470	29,304	
GB Cod	454,696	364,576	-90,120	327,640	7,631	335,272	29,304	92.0	45,470	29,304	0
GOM Cod	61,217	31,796	-29,421	4,164	295	4,459	27,337	14.0	6,122	6,122	21,215
GB Haddock East	1,388,646	1,091,859	-296,787	85,718	115	85,832	1,006,027	7.9	NA	NA	
GB Haddock West	3,295,776	2,585,987	-709,789	642,368	3,100	645,468	1,940,519	25.0	468,442	468,442	
GB Haddock	4,684,422	3,677,846	-1,006,576	728,086	3,214	731,300	2,946,546	19.9	468,442	468,442	2,478,104
GOM Haddock	13,193	12,775	-418	136	18	154	12,622	1.2	1,319	1,319	11,302
GB Yellowtail Flounder	292,814	212,284	-80,530	201,751	10,531	212,281	3	100.0	NA	NA	
SNE Yellowtail	28,336	23,032	-5,304	18,529	1,162	19,692	3,340	85.5	2,834	2,834	506
CC/GOM Yellowtail Flounder	83,175	64,118	-19,057	37,899	645	38,544	25,574	60.1	8,318	8,318	17,257
Plaice	252,128	226,067	-26,061	154,155	20,062	174,217	51,850	77.1	25,213	25,213	26,637
Witch Flounder	76,160	70,987	-5,173	56,359	9,765	66,124	4,864	93.1	7,616	4,864	0
GB Winter Flounder	694,918	532,431	-162,487	428,300	5,609	433,909	98,522	81.5	69,492	69,492	29,030
GOM Winter Flounder	11,156	5,920	-5,236	0	3	3	5,918	0.0	1,116	1,116	4,802
SNE Winter Flounder	NA	NA	NA	172	3,497	3,669	NA	NA	NA	NA	
Redfish	74,200	73,388	-812	10,904	1,838	12,742	60,647	17.4	7,420	7,420	53,227
White Hake	43,162	39,638	-3,524	25,743	7,109	32,852	6,787	82.9	4,316	4,316	2,470
Pollock	273,807	257,796	-16,011	62,969	1,625	64,593	193,203	25.1	27,381	27,381	165,822
Northern Windowpane	NA	NA	NA	0	33,383	33,383	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	4,496	4,496	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	60	10,528	10,588	NA	NA	NA	NA	
Halibut	NA	NA	NA	182	1,041	1,223	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	1,237	1,237	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 10 – NEFS VIII FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trade	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE$_{Final}$ - Catch	ACE$_{Final}$ Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	54,842	65,053	10,211	59,632	5,422	65,053	-1	100.0	NA	NA	
GB Cod West	501,688	508,364	6,676	433,317	15,809	449,126	59,238	88.3	55,653	55,653	
GB Cod	556,530	573,417	16,887	492,949	21,231	514,180	59,237	89.7	55,653	55,653	3,584
GOM Cod	46,761	13,288	-33,473	12,524	274	12,798	490	96.3	4,676	490	0
GB Haddock East	1,746,944	1,743,943	-3,001	329,728	2,619	332,347	1,411,596	19.1	NA	NA	
GB Haddock West	4,146,152	4,139,028	-7,124	908,054	2,607	910,662	3,228,366	22.0	589,310	589,310	
GB Haddock	5,893,096	5,882,971	-10,125	1,237,783	5,226	1,243,009	4,639,962	21.1	589,310	589,310	4,050,652
GOM Haddock	3,644	1,053	-2,591	445	21	466	587	44.3	364	364	222
GB Yellowtail Flounder	289,088	261,341	-27,747	241,307	20,003	261,309	31	100.0	NA	NA	
SNE Yellowtail	40,744	40,468	-276	25,459	182	25,641	14,827	63.4	4,074	4,074	10,752
CC/GOM Yellowtail Flounder	124,825	86,382	-38,443	77,801	1,095	78,896	7,486	91.3	12,483	7,486	0
Plaice	152,808	172,041	19,233	75,173	20,195	95,368	76,673	55.4	15,281	15,281	61,392
Witch Flounder	58,668	53,808	-4,860	44,223	5,511	49,735	4,073	92.4	5,867	4,073	0
GB Winter Flounder	842,352	846,358	4,006	653,343	5,952	659,295	187,063	77.9	84,235	84,235	102,828
GOM Winter Flounder	11,660	3,464	-8,196	6	11	17	3,447	0.5	1,166	1,166	2,281
SNE Winter Flounder	NA	NA	NA	121	8,839	8,960	NA	NA	NA	NA	
Redfish	65,835	94,925	29,090	19,967	1,907	21,875	73,050	23.0	6,584	6,584	66,467
White Hake	28,779	65,121	36,342	54,892	487	55,378	9,742	85.0	2,878	2,878	6,864
Pollock	233,708	275,547	41,839	132,447	448	132,895	142,652	48.2	23,371	23,371	119,282
Northern Windowpane	NA	NA	NA	70	34,106	34,176	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	2,543	2,543	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	22,104	22,104	NA	NA	NA	NA	
Halibut	NA	NA	NA	497	2,597	3,094	NA	NA	NA	NA	
Wolfish	NA	NA	NA	6	259	265	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 11 – NEFS IX FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE Initial	ACE Final	Trade Final Net	Catch Landings	Catch Discards ^	Catch Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	93,032	124,986	31,954	104,593	8,406	112,999	11,987	90.4	NA	NA	
GB Cod West	851,053	1,337,581	486,528	1,196,150	68,317	1,264,467	73,114	94.5	94,409	85,101	
GB Cod	944,085	1,462,567	518,482	1,300,743	76,723	1,377,466	85,101	94.2	94,409	85,101	0
GOM Cod	167,695	204,904	37,209	177,365	730	178,094	26,810	86.9	16,770	16,770	10,040
GB Haddock East	2,727,022	2,990,593	263,571	669,807	4,508	674,315	2,316,278	22.5	NA	NA	
GB Haddock West	6,472,242	7,127,989	655,747	2,107,540	10,093	2,117,632	5,010,356	29.7	919,926	919,926	
GB Haddock	9,199,264	10,118,582	919,318	2,777,347	14,600	2,791,947	7,326,634	27.6	919,926	919,926	6,406,708
GOM Haddock	86,211	20,831	-65,380	13,231	54	13,285	7,546	63.8	8,621	7,546	0
GB Yellowtail Flounder	343,761	512,481	168,720	444,943	60,207	505,150	7,332	98.6	NA	NA	
SNE Yellowtail	48,803	71,505	22,702	20,075	8	20,084	51,422	28.1	4,880	4,880	46,541
CC/GOM Yellowtail Flounder	164,854	205,519	40,665	153,114	2,819	155,933	49,586	75.9	16,485	16,485	33,101
Plaice	473,209	543,331	70,122	201,919	43,682	245,601	297,730	45.2	47,321	47,321	250,409
Witch Flounder	143,089	183,567	40,478	148,070	21,190	169,260	14,308	92.2	14,309	14,308	0
GB Winter Flounder	1,373,955	1,537,322	163,367	1,213,930	18,571	1,232,501	304,821	80.2	137,395	137,395	167,425
GOM Winter Flounder	8,950	15,283	6,333	17	6	22	15,261	0.1	895	895	14,366
SNE Winter Flounder	NA	NA	NA	8,843	9,183	18,026	NA	NA	NA	NA	
Redfish	872,638	929,352	56,714	264,665	44,726	309,391	619,961	33.3	87,264	87,264	532,697
White Hake	229,262	343,424	114,162	307,497	13,000	320,497	22,927	93.3	22,926	22,926	1
Pollock	1,392,838	2,116,960	724,122	1,137,715	6,124	1,143,839	973,121	54.0	139,284	139,284	833,837
Northern Windowpane	NA	NA	NA	0	143,128	143,128	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	124	124	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	31,249	31,249	NA	NA	NA	NA	
Halibut	NA	NA	NA	1,740	5,620	7,360	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	5,220	5,220	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 12 – NEFS X FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	6,960	12	-6,948	0	0	0	12	0.0	NA	NA	
GB Cod West	63,674	89,460	25,786	67,214	1,063	68,277	21,182	76.3	7,063	7,063	
GB Cod	70,634	89,472	18,838	67,214	1,063	68,277	21,195	76.3	7,063	7,063	14,131
GOM Cod	513,036	497,270	-15,766	376,936	11,543	388,478	108,792	78.1	51,304	51,304	57,488
GB Haddock East	68,329	74,687	6,358	0	0	0	74,687	0.0	NA	NA	
GB Haddock West	162,169	177,260	15,091	18,819	18	18,838	158,422	10.6	23,050	23,050	
GB Haddock	230,498	251,947	21,449	18,819	18	18,838	233,109	7.5	23,050	23,050	210,059
GOM Haddock	49,764	41,327	-8,437	7,346	101	7,447	33,880	18.0	4,976	4,976	28,903
GB Yellowtail Flounder	307	11	-296	0	0	0	11	0.0	NA	NA	
SNE Yellowtail	1,306	331	-975	0	0	0	331	0.0	131	131	201
CC/GOM Yellowtail Flounder	200,899	235,246	34,347	190,423	17,565	207,988	27,258	88.4	20,090	20,090	7,168
Plaice	108,791	106,052	-2,739	14,405	6,395	20,800	85,252	19.6	10,879	10,879	74,373
Witch Flounder	54,853	53,488	-1,365	41,568	1,113	42,681	10,807	79.8	5,485	5,485	5,322
GB Winter Flounder	239	311	72	0	0	0	311	0.0	24	24	287
GOM Winter Flounder	56,812	60,598	3,786	43,433	403	43,836	16,762	72.3	5,681	5,681	11,081
SNE Winter Flounder	NA	NA	NA	62	639	701	NA	NA	NA	NA	
Redfish	86,440	87,840	1,400	2,934	580	3,514	84,326	4.0	8,644	8,644	75,682
White Hake	52,031	24,743	-27,288	18,241	895	19,136	5,607	77.3	5,203	5,203	404
Pollock	525,852	537,595	11,743	64,865	1,734	66,599	470,996	12.4	52,585	52,585	418,411
Northern Windowpane	NA	NA	NA	12	5,403	5,415	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	2,878	2,878	NA	NA	NA	NA	
Halibut	NA	NA	NA	206	893	1,099	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	3,224	3,224	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 13 – NEFS XI FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

	ACE		Trades	Catch			Comparison of Catch and Final ACE				
Stock	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	2,952	822	-2,130	0	0	0	822	0.0	NA	NA	
GB Cod West	27,003	2,625	-24,378	0	0	0	2,625	0.0	2,995	2,995	
GB Cod	29,955	3,447	-26,508	0	0	0	3,447	0.0	2,995	2,995	451
GOM Cod	1,375,164	1,213,417	-161,747	1,040,351	22,430	1,062,781	150,636	87.6	137,516	137,516	13,120
GB Haddock East	9,778	9,778	0	0	0	0	9,778	0.0	NA	NA	
GB Haddock West	23,206	23,206	0	0	0	0	23,206	0.0	3,298	3,298	
GB Haddock	32,983	32,983	0	0	0	0	32,983	0.0	3,298	3,298	29,685
GOM Haddock	58,418	30,900	-27,518	17,703	724	18,428	12,473	59.6	5,842	5,842	6,631
GB Yellowtail Flounder	29	29	0	0	0	0	29	0.0	NA	NA	
SNE Yellowtail	94	94	0	0	0	0	94	0.0	9	9	84
CC/GOM Yellowtail Flounder	37,927	18,308	-19,619	9,058	1,609	10,667	7,641	58.3	3,793	3,793	3,848
Plaice	117,224	70,250	-46,974	12,684	4,934	17,618	52,633	25.1	11,722	11,722	40,910
Witch Flounder	34,871	13,464	-21,407	7,931	1,158	9,089	4,375	67.5	3,487	3,487	888
GB Winter Flounder	144	144	0	0	0	0	144	0.0	14	14	130
GOM Winter Flounder	7,391	4,828	-2,563	2,606	130	2,735	2,093	56.6	739	739	1,354
SNE Winter Flounder	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Redfish	283,102	282,718	-384	32,333	3,596	35,929	246,789	12.7	28,310	28,310	218,479
White Hake	271,643	200,772	-70,871	166,971	4,405	171,376	29,396	85.4	27,164	27,164	2,232
Pollock	3,379,854	3,399,411	19,557	1,588,966	59,253	1,648,219	1,751,192	48.5	337,985	337,985	1,413,207
Northern Windowpane	NA	NA	NA	0	57	57	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	13	13	NA	NA	NA	NA	
Halibut	NA	NA	NA	659	3,868	4,527	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	1,136	1,136	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 14 – NEFS XII FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	60	200	140	0	0	0	200	0.0	NA	NA	
GB Cod West	546	189	-357	0	0	0	189	0.0	61	61	
GB Cod	605	388	-217	0	0	0	388	0.0	61	61	328
GOM Cod	126,954	113,323	-13,631	94,176	2,190	96,366	16,957	85.0	12,695	12,695	4,261
GB Haddock East	43	1,354	1,311	0	0	0	1,354	0.0	NA	NA	
GB Haddock West	102	3,175	3,073	0	0	0	3,175	0.0	14	14	
GB Haddock	144	4,528	4,384	0	0	0	4,528	0.0	14	14	4,514
GOM Haddock	2,384	4,285	1,901	349	0	349	3,935	8.2	238	238	3,697
GB Yellowtail Flounder	8	3	-5	0	0	0	3	0.0	NA	NA	
SNE Yellowtail	6	4	-2	0	0	0	4	0.0	1	1	4
CC/GOM Yellowtail Flounder	8,311	20,862	12,551	15,378	2,817	18,195	2,668	87.2	831	831	1,836
Plaice	22,789	29,037	6,248	9,300	1,871	11,171	17,866	38.5	2,279	2,279	15,587
Witch Flounder	5,171	6,614	1,443	4,039	312	4,351	2,263	65.8	517	517	1,746
GB Winter Flounder	4	2	-2	0	0	0	2	0.0	0	0	2
GOM Winter Flounder	1,132	5,128	3,996	2,557	31	2,588	2,540	50.5	113	113	2,427
SNE Winter Flounder	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Redfish	10,127	3,761	-6,366	8	33	41	3,720	1.1	1,013	1,013	2,707
White Hake	1,948	1,162	-786	58	0	58	1,104	5.0	195	195	909
Pollock	19,167	9,597	-9,570	290	5	295	9,303	3.1	1,917	1,917	7,386
Northern Windowpane	NA	NA	NA	0	194	194	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	2	2	NA	NA	NA	NA	
Halibut	NA	NA	NA	0	9	9	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	456	456	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 15 – NEFS XIII FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	56,077	56,962	885	44,069	895	44,964	11,998	78.9	NA	NA	
GB Cod West	512,987	579,494	66,507	424,641	16,209	440,850	138,645	76.1	56,906	56,906	
GB Cod	569,064	636,456	67,392	468,709	17,104	485,814	150,643	76.3	56,906	56,906	93,736
GOM Cod	70,017	29,355	-40,662	21,167	97	21,264	8,091	72.4	7,002	7,002	1,090
GB Haddock East	3,717,136	3,720,137	3,001	79,962	549	80,511	3,639,626	2.2	NA	NA	
GB Haddock West	8,822,151	8,829,275	7,124	2,017,257	2,848	2,020,105	6,809,170	22.9	1,253,929	1,253,929	
GB Haddock	12,539,287	12,549,412	10,125	2,097,219	3,397	2,100,616	10,448,796	16.7	1,253,929	1,253,929	9,194,867
GOM Haddock	10,631	10,891	260	17	7	24	10,867	0.2	1,063	1,063	9,804
GB Yellowtail Flounder	279,823	292,325	12,502	244,919	14,200	259,119	33,206	88.6	NA	NA	
SNE Yellowtail	71,966	98,211	26,245	72,943	4,227	77,170	21,041	78.6	7,197	7,197	13,845
CC/GOM Yellowtail Flounder	53,374	34,946	-18,428	13,510	4,152	17,662	17,283	50.5	5,337	5,337	11,946
Plaice	214,013	214,780	767	70,212	15,620	85,832	128,949	40.0	21,401	21,401	107,547
Witch Flounder	84,700	81,690	-3,010	49,740	5,628	55,368	26,322	67.8	8,470	8,470	17,852
GB Winter Flounder	441,135	437,129	-4,006	323,720	4,763	328,484	108,646	75.1	44,114	44,114	64,532
GOM Winter Flounder	4,857	5,725	868	1,980	71	2,051	3,674	35.8	486	486	3,189
SNE Winter Flounder	NA	NA	NA	2,703	11,344	14,047	NA	NA	NA	NA	
Redfish	682,250	673,160	-9,090	38,309	5,911	44,220	628,940	6.6	68,225	68,225	560,715
White Hake	99,324	77,982	-21,342	59,562	4,423	63,985	13,996	82.1	9,932	9,932	4,064
Pollock	803,507	791,668	-11,839	122,311	730	123,041	668,627	15.5	80,351	80,351	588,276
Northern Windowpane	NA	NA	NA	0	46,771	46,771	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	30	35,721	35,751	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	18,854	18,854	NA	NA	NA	NA	
Halibut	NA	NA	NA	655	3,245	3,900	NA	NA	NA	NA	
Wolfish	NA	NA	NA	6	1,084	1,090	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 16 – Port Clyde Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	1,536	307	-1,229	0	0	0	307	0.0	NA	NA	
GB Cod West	14,051	482	-13,569	0	0	0	482	0.0	1,559	788	
GB Cod	15,586	788	-14,798	0	0	0	788	0.0	1,559	788	0
GOM Cod	473,541	424,997	-48,544	327,524	4,002	331,527	93,470	78.0	47,354	47,354	46,116
GB Haddock East	12,673	15,722	3,049	0	0	0	15,722	0.0	NA	NA	
GB Haddock West	30,077	37,312	7,235	0	0	0	37,312	0.0	4,275	4,275	
GB Haddock	42,750	53,034	10,284	0	0	0	53,034	0.0	4,275	4,275	48,759
GOM Haddock	41,613	39,158	-2,455	5,859	149	6,008	33,150	15.3	4,161	4,161	28,989
GB Yellowtail Flounder	65	62	-3	0	0	0	62	0.0	NA	NA	
SNE Yellowtail	4,776	343	-4,433	0	0	0	343	0.0	478	343	0
CC/GOM Yellowtail Flounder	16,728	13,450	-3,278	987	742	1,729	11,721	12.9	1,673	1,673	10,048
Plaice	398,541	392,607	-5,934	88,952	9,684	98,637	293,970	25.1	39,854	39,854	254,116
Witch Flounder	83,251	71,572	-11,679	44,819	6,489	51,309	20,264	71.7	8,325	8,325	11,939
GB Winter Flounder	285	283	-2	0	0	0	283	0.0	28	28	254
GOM Winter Flounder	7,467	4,615	-2,852	376	65	442	4,174	9.6	747	747	3,427
SNE Winter Flounder	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Redfish	385,364	364,329	-21,035	13,392	1,745	15,137	349,193	4.2	38,536	38,536	310,656
White Hake	258,315	254,727	-3,588	154,841	3,859	158,700	96,027	62.3	25,831	25,831	70,195
Pollock	1,557,580	1,587,879	30,299	362,331	4,748	367,079	1,220,800	23.1	155,758	155,758	1,065,042
Northern Windowpane	NA	NA	NA	61	217	278	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	13	27	40	NA	NA	NA	NA	
Halibut	NA	NA	NA	1,100	2,840	3,940	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	657	657	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 17 – Sustainable Harvest Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE$_{Final}$ - Catch	ACE$_{Final}$ Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	124,273	120,823	-3,450	64,479	3,229	67,707	53,116	56.0	NA	NA	
GB Cod West	1,136,842	1,359,116	222,274	986,272	32,913	1,019,185	339,931	75.0	126,112	126,112	
GB Cod	1,261,115	1,479,939	218,824	1,050,751	36,142	1,086,893	393,047	73.4	126,112	126,112	266,935
GOM Cod	1,801,761	1,577,960	-223,801	1,292,513	19,633	1,312,146	265,814	83.2	180,176	180,176	85,638
GB Haddock East	7,822,107	7,727,557	-94,550	1,776,678	16,633	1,793,311	5,934,246	23.2	NA	NA	
GB Haddock West	18,564,781	18,340,378	-224,403	5,229,886	16,761	5,246,647	13,093,731	28.6	2,638,689	2,638,689	
GB Haddock	26,386,888	26,067,935	-318,953	7,006,564	33,394	7,039,958	19,027,977	27.0	2,638,689	2,638,689	16,389,289
GOM Haddock	750,027	572,726	-177,301	257,620	2,637	260,257	312,469	45.4	75,003	75,003	237,466
GB Yellowtail Flounder	149,459	133,626	-15,833	85,526	16,602	102,128	31,498	76.4	NA	NA	
SNE Yellowtail	63,590	40,009	-23,581	22,727	751	23,479	16,530	58.7	6,359	6,359	10,171
CC/GOM Yellowtail Flounder	186,632	147,846	-38,786	69,671	9,331	79,002	68,844	53.4	18,663	18,663	50,180
Plaice	2,494,550	2,527,803	33,253	1,691,786	164,719	1,856,506	671,297	73.4	249,455	249,455	421,842
Witch Flounder	637,193	696,383	59,190	576,966	49,762	626,727	69,656	90.0	63,719	63,719	5,936
GB Winter Flounder	345,155	363,996	18,841	255,166	1,687	256,853	107,144	70.6	34,516	34,516	72,628
GOM Winter Flounder	24,973	22,108	-2,865	6,617	255	6,872	15,236	31.1	2,497	2,497	12,739
SNE Winter Flounder	NA	NA	NA	1,166	3,615	4,782	NA	NA	NA	NA	
Redfish	7,394,787	7,214,422	-180,365	2,355,486	138,966	2,494,452	4,719,970	34.6	739,479	739,479	3,980,491
White Hake	2,848,594	3,505,860	657,266	3,196,669	24,443	3,221,112	284,748	91.9	284,859	284,748	0
Pollock	13,908,712	13,166,301	-742,411	4,795,385	46,619	4,842,004	8,324,298	36.8	1,390,871	1,390,871	6,933,426
Northern Windowpane	NA	NA	NA	0	19,167	19,167	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	27	5,565	5,592	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	9,338	9,338	NA	NA	NA	NA	
Halibut	NA	NA	NA	5,430	8,593	14,022	NA	NA	NA	NA	
Wolfish	NA	NA	NA	491	8,491	8,982	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 18 – Tri-State Sector FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	ACE		Trades	Catch			Comparison of Catch and Final ACE				
	Initial	Final	Final Net	Landings	Discards ^	Catch	Difference ACE_{Final} - Catch	ACE_{Final} Caught (%)	Carryover Cap*	Carryover**	Remaindered ACE
GB Cod East	6,316	4,806	-1,510	0	0	0	4,806	0.0	NA	NA	
GB Cod West	57,780	43,964	-13,816	33,691	2,601	36,292	7,672	82.5	6,410	6,410	
GB Cod	64,096	48,770	-15,326	33,691	2,601	36,292	12,478	74.4	6,410	6,410	6,068
GOM Cod	88,102	74,903	-13,199	54,421	443	54,864	20,039	73.2	8,810	8,810	11,229
GB Haddock East	386,691	383,556	-3,135	0	0	0	383,556	0.0	NA	NA	
GB Haddock West	917,763	910,323	-7,440	368,005	3,741	371,746	538,576	40.8	130,445	130,445	
GB Haddock	1,304,454	1,293,879	-10,575	368,005	3,741	371,746	922,133	28.7	130,445	130,445	791,687
GOM Haddock	11,872	464	-11,408	98	0	98	365	21.2	1,187	365	0
GB Yellowtail Flounder	131,381	131,381	0	105,000	4,879	109,879	21,502	83.6	NA	NA	
SNE Yellowtail	8,301	8,298	-3	0	0	0	8,298	0.0	830	830	7,468
CC/GOM Yellowtail Flounder	38,004	35,446	-2,558	27,094	1,015	28,109	7,337	79.3	3,800	3,800	3,536
Plaice	72,636	63,240	-9,396	12,528	3,123	15,651	47,589	24.7	7,264	7,264	40,325
Witch Flounder	24,469	17,766	-6,703	6,194	852	7,046	10,720	39.7	2,447	2,447	8,273
GB Winter Flounder	79,094	79,094	0	45,800	281	46,081	33,013	58.3	7,909	7,909	25,104
GOM Winter Flounder	7,680	3,905	-3,775	3,636	22	3,658	247	93.7	768	247	0
SNE Winter Flounder	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Redfish	1,920	660	-1,260	0	0	0	660	0.0	192	192	468
White Hake	7,004	1,819	-5,185	56	600	657	1,162	36.1	700	700	462
Pollock	20,782	10,622	-10,160	275	256	531	10,091	5.0	2,078	2,078	8,012
Northern Windowpane	NA	NA	NA	0	3,576	3,576	NA	NA	NA	NA	
Southern Windowpane	NA	NA	NA	0	0	0	NA	NA	NA	NA	
Ocean Pout	NA	NA	NA	0	1,374	1,374	NA	NA	NA	NA	
Halibut	NA	NA	NA	0	157	157	NA	NA	NA	NA	
Wolfish	NA	NA	NA	0	97	97	NA	NA	NA	NA	

* Carryover Cap = maximum carryover allowed, 10% of initial ACE
^ Discards include both observed and calculated discards
** There is no carryover for GB Yellowtail Flounder. Up to 10% of Cod and Haddock maybe carried over, but will be added to GB Cod west and GB Haddock west ACEs in the following fishing year

Table 19 – Common Pool FY 2010 End of Year Accounting of NE Multispecies Catch (lbs)

Stock	sub-ACLs		Trades	Catch			Comparison of Catch and Final Sub-ACL		
	Initial	Final	Final Net	Landings	Discards	Catch	Difference ACL_{Final} - Catch	sub-ACL_{Final} Caught (%)	Remaindered Sub-ACL
GB Cod East	27,721	27,721	0	0	0	0	27,721	0.0	27,721
GB Cod West	253,594	253,594	0	144,303	40,786	185,090	68,504	73.0	68,504
GB Cod	281,315	281,315	0	144,303	40,786	185,090	96,225	65.8	96,225
GOM Cod	528,123	528,123	0	430,392	67,817	498,208	29,915	94.3	29,915
GB Haddock East	166,321	166,321	0	0	0	0	166,321	0.0	166,321
GB Haddock West	394,741	394,741	0	202,362	998	203,360	191,381	51.5	191,381
GB Haddock	561,062	561,062	0	202,362	998	203,360	357,702	36.2	357,702
GOM Haddock	57,608	57,608	0	15,304	429	15,733	41,875	27.3	41,875
GB Yellowtail Flounder	43,954	43,954	0	17,135	23,919	41,054	2,899	93.4	2,899
SNE Yellowtail	166,061	166,061	0	32,371	10,458	42,829	123,232	25.8	123,232
CC/GOM Yellowtail Flounder	109,317	109,317	0	40,162	41,171	81,333	27,984	74.4	27,984
Plaice	220,617	220,617	0	49,074	23,152	72,226	148,391	32.7	148,391
Witch Flounder	54,213	54,213	0	57,213	8,876	66,089	-11,876	121.9	-11,876
GB Winter Flounder	64,465	64,465	0	12,975	6,401	19,376	45,089	30.1	45,089
GOM Winter Flounder	54,594	54,594	0	48,883	7,135	56,018	-1,424	102.6	-1,424
SNE Winter Flounder	NA	NA	0	5,812	5,514	11,326	NA	NA	
Redfish	198,229	198,229	0	14,586	2,792	17,379	180,850	8.8	180,850
White Hake	112,338	112,338	0	87,689	9,669	97,358	14,980	86.7	14,980
Pollock	826,377	826,377	0	317,315	16,129	333,445	492,932	40.4	492,932
Northern Windowpane	NA	NA	0	0	4,055	4,055	NA	NA	
Southern Windowpane	NA	NA	0	16,495	29,585	46,080	NA	NA	
Ocean Pout	NA	NA	0	1,044	18,238	19,282	NA	NA	
Halibut	NA	NA	0	4,179	780	4,960	NA	NA	
Wolfish	NA	NA	0	0	7,659	7,659	NA	NA	

*Any value for a non-allocated species may be due to landings of that stock; misreporting of species and/or stock area; and/or estimated landings (in lieu of missing reports) based on vessel histories

Framework Adjustment 47

to the

Northeast Multispecies FMP

Appendix III

Calculation of Northeast Multispecies Annual Catch Limits, FY 2010 – FY 2012

This appendix documents the calculation of Northeast Multispecies Overfishing Levels (OFLs), Acceptable Biological Catches (ABCs), and Annual Catch Limits (ACLs) for FY 2010 - FY 2012. The general approach for all stocks is to first determine the OFL then determine the ABC. The ABC is distributed to various components of the fishery, and then an adjustment is made to these "sub-ABCs" to determine the ACLs, sub-ACLs, or other sub-components. The descriptions in this section are only accurate if the preferred alternative specifications are adopted.

For this action, the preferred alternative lists specifications for all Northeast Multispecies stocks for FY 2012. For XXX stocks, the FY 2012 values were established by FW 44 and the calculation of OFLs and ABCs are described in Appendix III to that document. That information is not repeated here; it is available at www.nefmc.org. For the remaining stocks, specifications are proposed for FY 2012 – FY 2014 and the calculations are described in detail. These stocks are:

GB winter flounder
SNE/MA winter flounder
GOM winter flounder
GB yellowtail flounder
GOM/GB windowpane flounder
SNE/MAB windowpane flounder
Ocean pout

This appendix also documents and clarifies how available catches are distributed to the sub-components of the fishery. These are listed for all stocks (even those where specifications are determined only for FY 2012) in order to keep a clear record of the distribution. Amendment 16 authorized changes to be made in a framework action and this summary documents several changes.

Determining OFL and ABC

Stocks with Age-Based Assessments and Projections

Catch levels (including OFLs, ABCs, and ACLs) for the following stocks are based on age-based projections:

GB yellowtail flounder
GB winter flounder
SNE/MA winter flounder

For these stocks the projections were performed using the Northeast Fisheries Science Center's (NEFSC) AGEPRO projection model. The two winter flounder stocks were last assessed at SARC 52 (NEFSC 2011). GB yellowtail flounder was assessed by the Transboundary Resource Assessment Committee (TRAC) in 2011, with a terminal year of 2010.

There are a number of assumptions that must be made to complete the projections. All of these assumptions are potential sources of error. The assumptions for recruitment, selectivity, and weights-at-age that were used were those recommended by the SARC and TRAC review panels.

Since the first year for ACLs based on these projections is 2012, an additional assumption must be made in the projections for the years between the terminal year and 2012 (in this case, 2011). An estimate of 2011 catch developed by the NEFSC was input into the projection model. The values may differ from realized catches and introduce uncertainty into the results. The 2011 catch assumptions for these projections are provided in Table 1.

When calculating the OFL in future years, F_{MSY} is used as the fishing mortality in the projection. When calculating the ABC, either 75% of F_{MSY} or Frebuild is used (whichever is lower). This is consistent with the ABC control rules recommended by the Science and Statistical Committee (SSC) and adopted in Amendment 16. There are two exceptions. For GB yellowtail flounder, because there are two assessment models extant, FY 2013 ABCs are preliminary and are expected to be revisited after the 2011 TRAC assessment. For SNE/MA winter flounder, the ABC was calculated using the fishing mortality expected to result from management measures designed to achieve a mortality as close to 0 as possible. The value selected was the average of the realized fishing mortality for CY 2009 and 2010. Specific mortality targets used for the ABC projections are provided in Table 2.

Projection output used for setting ABCs is in Appendix IV.

Stocks with Index-Based Assessments

For these three stocks, the OFL was calculated as the F_{MSY} proxy applied to the most recent biomass estimate (a survey-based proxy). The ABC was calculated as 75% of F_{MSY} applied to the most recent biomass estimate. The index-based projection model was not used for any of these stocks. The R/V Bigelow survey indices were converted to R/V Albatross units but this correction did not use length-based conversion factors because these are not yet available.

Northern Windowpane Flounder
Southern Windowpane Flounder
Ocean Pout

Other Stocks

The GOM winter flounder assessment approved at SARC 52 is based on a swept area assessment model. The OFL and ABC are based on applying the F_{MSY} proxy to an estimate of swept area biomass, while the ABC is based on the default ABC control rule – 75 percent of the F_{MSY} proxy applied to the most recent estimate of swept area biomass.

Distribution of ABCs

Because the Council wants the ability to consider a different adjustment for management uncertainty for different components of the fishery, ABCs were first distributed to the components prior to applying this adjustment. A brief description of the components follows. Note that there are a few stock-specific instances (described in a later section) that may differ from this general overview.

ABC: Acceptable Biological Catch for the entire stock.

Canadian Share/Allowance: An amount from the stock that Canadian vessels are expected to harvest. For GB cod, GB haddock, and GB yellowtail flounder, this is based on the Canadian allocation under the TMGC (but see the GB yellowtail flounder discussion below). For other stocks with substantial Canadian catches this is based on an estimate of Canadian catch.

U.S. ABC: That portion of the ABC available to U.S. fishermen after accounting for Canadian harvests.

State waters: Portion of the U.S. ABC expected to be harvested from state waters, outside of the federal management plan.

Other sub-components: Portion of the U.S. ABC expected to be harvested by unidentified non-groundfish fishery components. These are not attributed to specific components because individual amounts are small. This action clarifies that in cases where there is no specific recreational allocation, unless otherwise specified recreational catches are counted against this sub-component. There are a few stocks where this may not be the case, such as when the majority of recreational catches are from state waters and the recreational catch is considered part of the state waters sub-component. These instances will be specifically identified.

Scallops: Portion of U.S. ABC either allocated to, or expected to be harvested by, the U.S. scallop fishery and specifically allocated to that fishery.

Groundfish: Portion of the U.S. ABC available to the groundfish fishery (including recreational and commercial vessels if there is a specific allocation). This ABC has several sub-components:

> Commercial: Portion of the U.S. ABC available to commercial vessels; this is further sub-divided into sector and common-pool portions.
>
> Recreational: Portion of the U.S. ABC available to recreational vessels.

MWT: Portion of the ABC available to herring mid-water trawl vessels. Currently only applies to the two haddock stocks.

Table 3 summarizes the distribution of the U.S. ABC to the various sub-components, while Table 4 provides the resulting ABCs. Details on the distribution of specific stocks are provided below. Changes are the result of FY 2010 catches and are intended to more closely align allocations with recent experiences. It is expected that these values may be changed in future actions as more experience with the ACL system is gained.

a. GB cod: FW 44 was ambiguous on how to treat recreational catches of this stock. At the time, recreational catches were less than 10 mt, but catches have increased in recent years. Since the Council has not identified a specific commercial/recreational allocation, recreational catches will be assigned to the “other subcomponents” category unless a recreational allocation is made in the future. This is the only change to the distribution of ABCs/ACLs for this stock.

b. GOM cod: The division into sub-components was calculated differently for this stock based on the way the components were calculated by the PDT. First, the PDT calculated the recreational/commercial allocation as described in Amendment 16 using the numbers of fish caught (as determined by GARM III). This was done without regard to whether the fish were caught in state waters or not. In contrast, the state waters component (10 percent) came from a NMFS report required by the M-S Act reauthorization and included commercial catches only. Similarly, “other sub-components” represented only commercial catches since a specific recreational/commercial component was anticipated. The state waters component and the other sub-component portion are thus calculated as a percent of the commercial allocation (e.g. 10 percent of the 66.3 percent commercial allocation).

The recreational harvest of cod from state waters (without regard to stock) averaged 19 percent from 2001-2008, but was highly variable and ranged from 9 percent to 35 percent. Proportional standard errors (PSEs) are also high for the state waters components, indicating high uncertainty over these values. It is not known how much of the state waters recreational catch came from party/charter boats with federal permits that should be subject to ACL requirements. These factors make it difficult to determine what percentage of the recreational allocation is expected to be harvested from state waters.

The PDT calculated the groundfish recreational and commercial ACLs based on the recreational/commercial percentages as determined by the Council (based on historical data). Since some of the recreational catch comes from state waters, the ACL for recreational fishermen is higher than if a specific state water recreational allocation could be identified. It also means in order to monitor and account for recreational catch, all recreational catches (including state waters catches) should be applied against the ACL.

The commercial components (state waters, other sub-components, and federal waters) add to the total commercial allocation.

Another issue for this stock is that an assessment was scheduled for December 2011, with final results not expected to be released until January 2012, after submission of this document. The document analyzes a range of catch levels and NMFS will base the final level on an ABC based on the assessment results. The distribution shown below is for the ABC consistent with that implemented by FW 44 (9.018 mt in FY 2012) and is roughly the middle of the range considered in the document. At lower levels, adjustments may be needed to correctly account for state waters catches.

			Rec	Comm	Total
Shares,	Based on Total Catch, in Numbers		0.337	0.663	1.0
	FY 2010 ABC, Based on Totals		3,039	5,979	9,018
		State waters (assumed all commercial)		598	
		Other sub (assumed all commercial)		299	
	Adjusted ABC		3,039	5,082	

c. GOM haddock: This stock has similar issues recreational/commercial issues as GOM cod. Calculations were done in a similar fashion. One difference is that there is a portion of this stock that is allocated to the MWT fishery. This is based on 1% of the total ABC. The ABC is first divided between the recreational and commercial fisheries. In FY 2010, 94.6% of the state waters allowance was caught but only 3.6% of the “other subcomponents” was caught. This action modifies the state waters allowance to 2% (from 1%) and decreases the other subcomponents to 3% (from 4%). The MWT share is also subtracted from the commercial ABC.

			Rec	Comm	Total
Shares,	Based on Total Catch, in Numbers		0.275	0.725	1
	ABC, Based on Totals		279	734	1,013
		MWT Haddock		10	
		State waters (assumed all commercial)		15	
		Other sub (assumed all commercial)		22	
	Adjusted ABC		279	**687**	
	ACL				

d. GB yellowtail flounder: There is no state waters component because the stock area does not include state waters. Five percent is considered an “other subcomponent” caught in other fisheries. As described in the framework text, there is an allocation to the scallop fishery that is based on an estimate of the amount the fishery is expected to harvest if the scallop yield is taken. This was estimated for FW 44 and the allocation has not been changed even though the ABC has been revised. In FY 2010, only 12% of the other sub-components catch was caught. This action reduces this allocation to 4 percent (from 5 percent) and this increases the amount allocated to the commercial fishery.

e. SNE/MA yellowtail flounder: One percent is expected to be taken in state waters. Four percent is considered an “other subcomponent” caught in other fisheries. As described in the framework text, there is an allocation to the scallop fishery that is based on an estimate of the amount the fishery is expected to harvest if the scallop yield is taken. This was estimated for FW 44 and the allocation has not been changed even though the ABC has been revised.

f. CC/GOM yellowtail flounder: The state waters allowance (1%) was too small in FY 2010 when catches totaled 368.6% of the amount allowed. The ABC increases significantly in FY 2012. The other subcomponents catch was only 39.4% of the amount allocated. This action increases the state waters allowance to 3% and decreases the other subcomponents allocation to 2% (from 4%).

g. Witch flounder: In FY 2010 catches were more than twice the state waters allowance (207.3%) and the other subcomponents catches were 421.3% of the allocation. The allowance for state waters catches would be increased to 3%, which would reduce the allocation to groundfish to 93% (from 95%). There may be a need in the future to adjust the other subcomponents portion of the ABC if it is exceeded again, but no change is proposed in this action because while the overage was large in relative terms it was small in absolute terms.

h. GB winter flounder: There is no state waters allocation because the stock area does not include state waters.

i. GOM winter flounder: The recreational fishery is almost entirely in state waters. From 2005 to 2007, the recreational harvest averaged 29 mt, but increased to 107 mt in 2008. ASMFC is adopting management measures to reduce harvests 11 percent. The PDT has allowed 60 mt for state waters/recreational harvest for this stock. This is 89 percent of the 2007/2008 average, reflecting the expected impacts of ASMFC measures. This is 25 percent of the ABC. For this stock recreational catches are counted against state waters catches.

j. SNE/MA winter flounder: Catches in state waters were over three times the allowance (341%) and the other subcomponents catches were 421% of the allocation. This action recommends increasing the state waters allowance to 28% (from 8%). The other subcomponents portion would be increased to 20% (from 5%). This reduces the groundfish allocation from 87% to 52% of the ABC. AS is the case for GOM winter flounder, for this stock nearly all the recreational catches are taken in state waters. For this stock recreational catches are counted against the state waters catches.

i. White hake: : Because more than 90% of the amount allowed to state waters was caught, this action would increase the state waters allowance to 2% and decrease the other subcomponents allocation to 3%.

j. Pollock: Recreational harvest increased to 912 mt in 2008, about 2.5 times the harvest from 2005 through 2007 and 24 percent of the ABC. Since 2001, about half of the recreational harvest has been from state waters. The PDT allowed 1,200 mt for recreational harvest in state waters, reflecting the amount in FY 2010. Pollock recreational catches are split between federal waters and state waters, so this value is split between state waters and the "other sub-components" category. While FW 44 included an allowance for Canadian catches the assessment completed in 2010 revised the stock unit to exclude Canadian catches and so an allowance is no longer needed.

k. Atlantic halibut: The Council estimates that about 50 percent of halibut catches are by Maine state vessels from state waters. State waters catches in FY 2010 were less than this amount, but no change is proposed in this action; the decision was made to wait for additional data before making a change. There are also some Canadian catches that will be attributed to the other subcomponents category

l. GOM/GB windowpane flounder: Only a fraction of the state waters allowance was caught in FY 2010, and only 18.6% of the other subcomponents allocation. The commercial groundfish fishery allocation was exceeded, with 139.5% caught. This action would keep the state waters allowance at 1%, and would reduce the other subcomponent allocation to 19%. This would increase the groundfish fishery sub-ACL to 80% (from 70%).

m. SNE/MAB windowpane flounder: In FY 2010, catches in state waters were 1,550% of the state waters allowance. The other subcomponents catches were 623.6% of the allocation. In FY 2010, the scallop fishery catch was 33% of the total catch. The groundfish fishery accounted for about 13.7% of the catch in FY 2010. The changes recommended by this action would increase the state waters allowance to 10%, increase the other subcomponents to 70% (50% for the scallop fishery and 20% for other fisheries), and reduce the groundfish fishery to 20% (from 70%). Because of the large catches by the scallop and other fisheries the Council may consider allocating sub-ACLs to other fisheries in a future action.

n. Ocean pout: The other subcomponents catch in FY 2010 was 227.7% of the amount allocated. This action would increase the allocation for FY 2012 to 9% and keep the state waters catch at 1%.

ACLs

After the ABCs are distributed to the various components, they are adjusted for management uncertainty. As discussed in Appendix II, the default sets the ACL at 95 percent of the ABC. For stocks with less management uncertainty the ACL is set at 97 percent of the ABC; for stocks with more uncertainty it is set at 93 percent of the ACL. Adjustments are shown in Table 5. The rationale for deviation from 95 percent for specific stocks is provided below.

a. GOM cod: The management uncertainty associated with the recreational fishery is greater than that associated with the commercial fishery because data for the recreational fishery is more uncertain than that from the commercial fishery, the number of participants is unknown, the AMs for the recreational fishery are implemented after a time lag, and impacts of the management measures are less predictable. Therefore the ACL for the recreational component was set at 93 percent of the ABC.

b. GOM haddock: The MWT ACL was set at 93 percent of the ABC due to uncertainty over monitoring of the herring MWT fishery.

The management uncertainty associated with the recreational fishery is greater than that associated with the commercial fishery because data for the recreational fishery is more uncertain than that from the commercial fishery, the number of participants is unknown, the AMs for the recreational fishery are implemented after a time lag, and impacts of the management measures are less predictable. Therefore the ACL for the recreational component was set at 93 percent of the ABC.

c. GB yellowtail flounder: The management uncertainty is less for this stock because this stock has been successfully managed with a hard TAC for several years and there are in-season AMs (Regional Administrator authority to modify in-season measures including trip limits, closures, gear restrictions, etc.). Therefore, the PDT set the ACL at 97 percent of the ABC. The same percentage is used for the scallop fishery in FY 2011 and FY 2012. There is no state waters allocation because the stock area does not include state waters.

d. SNE/MA yellowtail flounder: This stock is the only stock where catches exceeded TTACs for several years. Also, non-groundfish fisheries may catch this stock. The PDT set the ACL at 93 percent of the ABC in recognition of the fact management measures may not be as effective at keeping catch levels below the desired catch level for this stock. The same percentage is used for the scallop fishery in FY 2011 and FY 2012.

e. SNE/MA winter flounder: The ACL was set at 93 percent of the ABC. With the adoption of Amendment 16, landings are prohibited, which will increase the uncertainty over catch. In addition, there are no controls on the catch of this stock by sector vessels other than a prohibition on retention (in contrast, the proposed measures for the common pool include two gear restricted areas that will help reduce impacts on this stock).

f. Windowpane flounders, ocean pout, Atlantic wolffish: Retention of these stocks is prohibited. In addition, there are no controls on the catches of these stocks by sector vessels other than a prohibition on retention. The ACL was set at 93 percent of the ABC, reflecting the additional uncertainty over catch.

g. GB haddock: The MWT ACL was set at 93 percent of the ABC due to uncertainty over monitoring of the herring MWT fishery.

Incidental Catch TACs

Part of the commercial non-sector ACL is allocated to the incidental catch TACs that limit catches of stocks of concern in the Category B (regular) DAS program and certain SAPs. Table 6 and Table 7 are reproduced from Amendment 16.

An incidental catch TAC is specified for American plaice even though GARM III determined this stock was not overfished and overfishing was not occurring. This was done for several reasons. First, stock size barely exceeds the minimum biomass threshold and is at 51% of B_{MSY}, and has not completed stock rebuilding. Given uncertainty in the assessment it was considered prudent to continue to control catches until certain that rebuilding is on track. Second, plaice is often caught with witch flounder, an overfished stock, and allowing vessels to target plaice in these programs would likely lead to excessive catches of witch flounder.

Table 1 – 2011 catch assumption used in age-based projections for stocks with recent age-based analytic assessments. Values are only provided for those three stocks with recent age-based assessments that are used as the basis for FY 2012 -2014 ABCs.

Stock	2011 Catch
GB Cod	
GB Haddock	
GB Yellowtail	2,650
SNE/MA Yellowtail	
CC/GOM Yellowtail	
GOM Cod	
Witch Flounder	
Plaice	
GOM Winter Flounder	
SNE/MA Winter Flounder	363
GB Winter Flounder	2,230
White Hake	
Pollock	
Redfish	
GOM Haddock	
Ocean pout	
Northern window	
Southern window	

Table 2 – Mortality targets used to calculate ABCs, FY 2012 – 2014. Information in grey text is for stocks last assessed at GARM III that do not have updated ABCs for FY 2012 -2014 specified in this action.
Note: SNE/MA winter flounder target fishing mortality is based on the average of 2009 – 2010.

Species	Stock	Basis for Target Fishing Mortality	Targeted Fishing Mortality or Exploitation	F_{msy}
Cod	GB	75%FMSY	0.184	0.2466
Cod	GOM	75%FMSY	0.18	0.237
Haddock	GB	75%FMSY	0.26	0.35
Haddock	GOM	75%FMSY	0.32	0.43
Yellowtail Flounder	GB	Frebuild(1)	0.188	0.254
Yellowtail Flounder	SNE/MA	Frebuild	0.072	0.254
Yellowtail Flounder	CC/GOM	75%FMSY	0.18	0.239
American Plaice	GB/GOM	75%FMSY	0.14	0.19
Witch Flounder		75%FMSY	0.15	0.2
Winter Flounder	GB	75% FMSY	0.315	0.420
Winter Flounder	GOM	75% FMSY	0.2325	0.31
Winter Flounder	SNE/MA	See text	0.07 (see note)	0.29
Redfish		75%FMSY	0.03	0.038
White Hake	GB/GOM	Frebuild	0.084	0.125
Pollock	GB/GOM	See text	4.245	5.66
Windowpane	GOM/GB	75%FMSY	n/a	0.5
Windowpane	SNE/MA	75%FMSY	n/a	1.47
Ocean Pout		75%FMSY	n/a	0.76
Atlantic Halibut		Frebuild	0.044	0.073
Atlantic Wolffish		75% FMSY	See text	

Table 3 – Distribution of ABC to fishery components. Sector PSCs are preliminary and may change based on final sector rosters.
(1) Includes commercial ABC in state waters and other subcomponents

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Cod	2012	5,616	513	5,103	0.01	0.04		0.95	0.95		0.978301389	
	2013		0	0	0.01	0.04		0.95	0.95		0.978301389	
	2014		0	0	0.01	0.04		0.95	0.95		0.978301389	
GOM Cod	2012	9,018	0	9,018	0.10	0.05		na	0.663	0.337	0.978468075	
	2013	500	0	500	0.10	0.05		na	0.663	0.337	0.978468075	
	2014	20,000	0	20,000	0.10	0.05		na	0.663	0.337	0.978468075	
GB Haddock	2012	39,846	9,120	30,726	0.01	0.04		0.940	0.94		0.993883768	0.01
	2013		0	0	0.01	0.04		0.940	0.94		0.993883768	0.01
	2014		0	0	0.01	0.04		0.940	0.94		0.993883768	0.01
GOM Haddock	2012	1,013		1,013	0.02	0.03		0.94	0.725	0.275	0.990240753	0.01
	2013			0	0.02	0.03		0.94	0.725	0.275	0.990240753	0.01
	2014			0	0.02	0.03		0.94	0.725	0.275	0.990240753	0.01
GB Yellowtail Flounder	2012	1,150	586	564	0.00	0.04	0.562	0.398	0.40		0.982913844	
	2013	1,150	0	0	0.00	0.04					0.982913844	
	2014		0	0	0.00	0.04					0.982913844	
SNE/MA Yellowtail Flounder	2012	1,003		1,003	0.01	0.04	0.136	0.814	0.81		0.770551565	
	2013			0	0.01	0.04					0.770551565	
	2014			0	0.01	0.04					0.770551565	
CC/GOM Yellowtail Flounder	2012	1,159		1,159	0.03	0.02		0.95	0.95		0.9717042	
	2013			0	0.03	0.02		0.95	0.95		0.9717042	
	2014			0	0.03	0.04		0.93	0.93		0.9717042	
Plaice	2012	3,632		3,632	0.01	0.04		0.95	0.95		0.977319652	
	2013			0	0.01	0.04		0.95	0.95		0.977319652	
	2014			0	0.01	0.04		0.95	0.95		0.977319652	
Witch Flounder	2012	1,639		1,639	0.03	0.04		0.93	0.93		0.979650512	
	2013			0	0.03	0.04		0.93	0.93		0.979650512	
	2014			0	0.03	0.04		0.93	0.93		0.979650512	

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Ground-fish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Winter Flounder	2012	3,753		3,753	0.00	0.05		0.95	0.95		0.993125515	
	2013	3,750		3,750	0.00	0.05		0.95	0.95		0.993125515	
	2014	3,598		3,598	0.00	0.05		0.95	0.95		0.993125515	
GOM Winter Flounder	2012	1,078		1,078	0.25	0.05		0.70	0.70		0.949972429	
	2013	1,078		1,078	0.25	0.05		0.70	0.70		0.949972429	
	2014	1,078		1,078	0.25	0.05		0.70	0.70		0.949972429	
SNE/MA Winter Flounder	2012	626		626	0.28	0.20		0.52	0.52			
	2013	697		697	0.28	0.20		0.52	0.52			
	2014	912		912	0.28	0.20		0.52	0.52			
Redfish	2012	9,224		9,224	0.01	0.04		0.95	0.95		0.995193093	
	2013			0	0.01	0.04		0.95	0.95		0.995193093	
	2014			0	0.01	0.04		0.95	0.95		0.995193093	
White Hake	2012	3,638		3,638	0.02	0.03		0.95	0.95		0.990422378	
	2013			0	0.02	0.03		0.95	0.95		0.990422378	
	2014			0	0.02	0.03		0.95	0.95		0.990422378	
Pollock	2012	15,400		15,400	0.05	0.09		0.86	0.86		0.992546584	
	2013	15,600		15,600	0.05	0.09		0.86	0.86		0.992546584	
	2014	16,000		16,000	0.05	0.09		0.87	0.87		0.992546584	
N. Window-pane Flounder	2012	173		173	0.01	0.19		0.80	0.80			
	2013	173		173	0.01	0.19		0.80	0.80			
	2014	173		173	0.01	0.19		0.80	0.80			
S. Window-pane Flounder	2012	386		386	0.10	0.70		0.20	0.20			
	2013	386		386	0.10	0.70		0.20	0.20			
	2014	386		386	0.10	0.70		0.20	0.20			
Ocean Pout	2012	256		256	0.01	0.09		0.90	0.90			
	2013	256		256	0.01	0.09		0.90	0.90			
	2014	256		256	0.01	0.09		0.90	0.90			

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
Atlantic Halibut	2012	85		85	0.50	0.05		0.45	0.45			
	2013	85		85	0.50	0.05		0.45	0.45			
	2014	85		85	0.50	0.05		0.45	0.45			
Atlantic Wolffish	2012	83		83	0.01	0.04		0.95	0.95			
	2013	83		83	0.01	0.04		0.95	0.95			
	2014	83		83	0.01	0.04		0.95	0.95			

Table 4 – Distribution of ABC to fishery components

(1) Includes commercial ABC in state waters and other sub-components

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	Non-Sector	MWT
GB Cod	2012	5,616	513	5,103	51	204	0	4,848	4,848	0	4,743	105	0
	2013		0	0	0	0	0	0	0	0	0	0	0
	2014		0	0	0	0	0	0	0	0	0	0	0
GOM Cod	2012	9,018	0	9,018	598	299	0	9,018	5,979	3,039	4,973	109	0
	Low	500	0	500	33	17	0	500	332	169	276	6	0
	High	20,000	0	20,000	1,326	663	0	20,000	13,260	6,740	11,028	243	0
GB Haddock	2012	39,846	9,120	30,726	307	1,229	0	28,882	28,882	0	28,706	177	307
	2013		0	0	0	0	0	0	0	0	0	0	0
	2014		0	0	0	0	0	0	0	0	0	0	0
GOM Haddock	2012	1,013		1,013	15	22	0	1,013	734	279	681	7	10
	2013			0	0	0	0	0	0	0	0	0	0
	2014			0	0	0	0	0	0	0	0	0	0
GB Yellowtail Flounder	2012	1,150	586	564	0	23	317.0	224	224	0	221	4	0
	2013	1,150	0	0	0	0							0
	2014		0	0	0	0				0			0
SNE/MA Yellowtail Flounder	2012	1,003		1,003	10	40	136	817	817	0	629	187	0
	2013			0	0	0				0			0
	2014			0	0	0				0			0
CC/GOM Yellowtail Flounder	2012	1,159		1,159	35	23	0	1,101	1,101	0	1,070	31	0
	2013			0	0		0			0			0
	2014			0	0	0	0	0	0	0	0	0	0
Plaice	2012	3,632		3,632	36	145	0	3,450	3,450	0	3,372	78	0
	2013			0	0	0	0	0	0	0	0	0	0
	2014			0	51	204	0	4,848	4,848	0	4,743	105	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Witch Flounder	2012	1,639		49	66	0	1,524	1,524	0	1,493	31	0	1,639
	2013			0	0	0	0	0	0	0	0	0	0
	2014			0	0	0	0	0	0	0	0	0	0
GB Winter Flounder	2012	3,753		0	188	0	3,565	3,565	0	3,541	25	0	3,753
	2013	3,750		0	188	0	3,563	3,563	0	3,538	24	0	3,750
	2014	3,598		0	180	0	3,418	3,418	0	3,395	23	0	3,598
GOM Winter Flounder	2012	1,078		272	54	0	752	752	0	715	38	0	1,078
	2013	1,078		272	54	0	752	752	0	715	38	0	1,078
	2014	1,078		272	54	0	752	752	0	715	38	0	1,078
NE/MA Winter Flounder	2012	626		175	125	0	326	326	0	0	326	0	626
	2013	697		195	139	0	362	362	0	0	362	0	697
	2014	912		255	182	0	474	474	0	0	474	0	912
Redfish	2012	9,224		92	369	0	8,763	8,763	0	8,721	42	0	9,224
	2013			0	0	0	0	0	0	0	0	0	0
	2014			0	0	0	0	0	0	0	0	0	0
White Hake	2012	3,638		73	109	0	3,456	3,456	0	3,423	33	0	3,638
	2013			0	0	0	0	0	0	0	0	0	0
	2014			0	0	0	0	0	0	0	0	0	0
Pollock	2012	15,400		3,293	754	1,370	0	13,276	13,276	0	13,177	99	0
	2013	15,600		3,293	756	1,380	0	13,464	13,464	0	13,364	100	0
	2014	16,000		3,293	760	1,400	0	13,840	13,840	0	13,737	103	0
N. Window-pane Flounder	2012	173		169	2	33	0	138	138	0	0	138	0
	2013	173		169	2	33	0	138	138	0	0	138	0
	2014	173		169	2	33	0	138	138	0	0	138	0
S. Window-pane Flounder	2012	386		237	39	270	0	77	77	0	0	77	0
	2013	386		237	39	270	0	77	77	0	0	77	0
	2014	386		237	39	270	0	77	77	0	0	77	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Ocean Pout	2012	256		256	3	23	0	230	230	0	0	230	0
	2013	256		256	3	23	0	230	230	0	0	230	0
	2014	256		256	3	23	0	230	230	0	0	230	0
Atlantic Halibut	2012	85		85	43	4	0	38	38	0	0	38	0
	2013	85		85	43	4	0	38	38	0	0	38	0
	2014	85		85	43	4	0	38	38	0	0	38	0
Atlantic Wolffish	2012	83		83	1	3	0	79	79	0	0	79	0
	2013	83		83	1	3	0	79	79	0	0	79	0
	2014	83		83	1	3	0	79	79	0	0	79	0

Table 5 – ACL adjustments

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non_ Sector Groundfish	Rec Groundfish	Sector PSC	MWT
GB Cod	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
GOM Cod	2010	1	1	1	0.95	0.95	0.93	0.95	1
	2011	1	1	1	0.95	0.95	0.93	0.95	1
	2012	1	1	1	0.95	0.95	0.93	0.95	1
GB Haddock	2010	1	1	1	0.95	0.95	0.95	0.95	0.93
	2011	1	1	1	0.95	0.95	0.95	0.95	0.93
	2012	1	1	1	0.95	0.95	0.95	0.95	0.93
GOM Haddock	2010	1	1	1	0.95	0.95	0.93	0.95	0.93
	2011	1	1	1	0.95	0.95	0.93	0.95	0.93
	2012	1	1	1	0.95	0.95	0.93	0.95	0.93
GB Yellowtail Flounder	2010	1	1	1	0.97	0.97	0.95	0.97	1
	2011	1	1	0.97	0.97	0.97	0.95	0.97	1
	2012	1	1	0.97	0.97	0.97	0.95	0.97	1
SNE/MA Yellowtail Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	0.93	0.93	0.93	0.95	0.93	1
	2012	1	1	0.93	0.93	0.93	0.95	0.93	1
CC/GOM Yellowtail Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Plaice	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Witch Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non-Sector Groundfish	Rec Groundfish	Sector PSC	MWT
GB Winter Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
GOM Winter Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
SNE/MA Winter Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
Redfish	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
White Hake	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Pollock	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
N. Windowpane Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
S. Windowpane Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
Ocean Pout	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non-Sector Groundfish	Rec Groundfish	Sector PSC	MWT
Atlantic Halibut	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Atlantic Wolffish	2010	1	1	1	0.93	0.93	0.95	0.95	1
	2011	1	1	1	0.93	0.93	0.95	0.95	1
	2012	1	1	1	0.93	0.93	0.95	0.95	1

Table 6 – Proposed incidental catch TACs for major stocks of concern (mt). TACs are for the fishing year. TACs shown are metric tons, live weight. Note: GB cod and GB yellowtail flounder TAC is determined annually and cannot be estimated in advance. Values are dependent on ACLs, which have not yet been determined.

	Percentage of ACL
GB cod	Two
GOM cod	One
GB Yellowtail	Two
CC/GOM yellowtail	One
SNE/MA Yellowtail	One
Plaice	Five
Witch Flounder	Five
SNE/MA Winter Flounder	One
GB Winter Flounder	Two
White Hake	Two
Pollock	Two

Table 7 - Proposed allocation of incidental catch TACs for major stocks of concern to Category B DAS programs (shown as percentage of the incidental catch TAC)

	Category B (regular) DAS Program	CAI Hook Gear SAP	Eastern US/CA Haddock SAP	Southern CAII Haddock SAP
GOM cod	100%	NA	NA	
GB cod	50%	16%	34%	
CC/GOM yellowtail	100%	NA	NA	
Plaice	100%	NA	NA	
White Hake	100%	NA	NA	
SNE/MA Yellowtail	100%	NA	NA	
SNE/MA Winter Flounder	100%	NA	NA	
Witch Flounder	100%	NA	NA	
GB Yellowtail	50%	NA	50%	
GB Winter Flounder	50%	NA	50%	
Pollock	50%	16%	34%	

Framework Adjustment 47

to the

Northeast Multispecies FMP

Appendix IV

Analytic Techniques: Derivation of Accountability Measure Areas

Development of Accountability Measure (AM) Areas

This action proposes to adopt area-based AMs for two windowpane flounder stocks, ocean pout, Atlantic wolffish, and Atlantic halibut. This section describes the analyses used to identify and define the areas. Much of the information in this section summarizes Groundfish Plan Development Team (PDT) reports documenting this work.

The approach used to identify the AM areas uses a combination of observer data and fishery-dependent data. To simplify analyses and make them consistent with data sources used in assessments, the fishery dependent catch data was queried from the "AA" tables created by the Northeast Fisheries Science Center (NEFSC). These tables assign a catch location to catch weights as reported to dealers by matching VTR records to dealer records. Not all trips can be matched and so some dealer records do not have position information; these were not included in the analyses. The analyses were performed for the major groundfish gear: otter trawl, longline, and sink gillnet. Note that these gears are used in other fisheries in addition to the groundfish fishery, particularly in the area south of New England. No attempt was made to assign each trip to a particular fishery, which introduces uncertainty into evaluating the impacts of the AM measures because as proposed they would only limit groundfish fishing trips.

Observer Data Analysis

The first step in the analysis was to query the observer database and extract observed tows for the three primary gears used in the groundfish fishery: large mesh otter trawl, large and extra-large mesh sink gillnets, and longlines. The following discussion will describe the steps used in the analysis for trawl gear catches of windowpane flounder and ocean pout, but similar approaches were used for the other two gears.

Data analyzed were from calendar years 2008 – 2010; all data were pooled. Pooling was done to get a greater geographic coverage of the observed tows and to increase the number of observed tows in the data set. This approach is problematic in that discard rates can differ from year to year and pooling the data glosses over those differences. On the other hand, the management system is unlikely to change the areas annually and so this approach gives a blended picture of discard rates over a recent time period.

The observed tow information on total kept catch and on the discards of windowpane flounder and ocean pout[1] were plotted in Arcview© GIS. The plotted tows were binned into ten-minute squares. This provided an illustration of the range of observer coverage as well as an indication of the squares where most observed discards were documented (see Figure 1 and Figure 2 for an example). The magnitude of observed discards in a square is related to the number of observed trips in a square so these data alone do not necessarily indicate the correct areas for AMs. The second step was to calculate a simple ratio of observed species discards to total kept catch (d/kall) in each ten-minute square. This

[1] Since almost all windowpane flounder and ocean pout has been discarded in recent years, the analysis for these species focused on discards. For wolffish and halibut the analysis included kept catch.

identifies areas with higher discard rates but still does not account for the number of observed tows – there is no measure of variability in this plot, and a square with one observed tow cannot be differentiated from a square with hundreds of observed tows (see Figure 3 for an example).

The discards from a ten-minute square are a function not only of the d/kall ratio but of the total fishing effort in the area. Conceptually the discard ratio can be expanded to an estimate of total discards from the area by multiplying it by the total kept catch in the same area. There is a concern with doing this type of analysis at small spatial scales because of the uncertainty over reported fishing locations. Groundfish fishermen are required to report one fishing location for every statistical area fished that represents the general area of fishing activity. Several studies have shown that while the information is reliable for assigning catch at the stock area level, it becomes less accurate as the spatial scale gets smaller (see, for example, Palmer and Wigley 2009). Nevertheless, the information is often used at small scales. Analyses for the future habitat actions bin the data into 10-km squares; protected species catch estimates bin the data at various depth profiles (Murray 2007); and the impacts of closed areas have been evaluated using the data binned into ten minute squares (Murawski et al. 2005). So for this analysis the data was binned at ten-minute squares. The data limitations must be kept in mind while evaluating these analyses and a criticism of this approach is that it places a heavy reliance on the accuracy of self-reported fishing locations that are known to be inaccurate. A assumption is that by pooling data over a three-year period it is likely the data are a fair representation of fishing activity even if an individual trip is misreported. Another consideration was the desire to make the AM areas as small as can be justified to minimize interference with other groundfish fishing activities. Binning the data at larger scales would make it difficult to identify smaller areas. A sensitivity analysis was performed with the data binned at 30 minute squares in the case of windowpane flounder and trawl gear to see how the analyses would change if binned at a larger scale.

With both observed d/kall and catch data binned into the same ten-minute squares the discards from each square can be estimated by multiplying the observed ratio by the reported kept all. The resulting value can be plotted - or, as is the case in Figure XXX, the log of the value can be plotted because the data are highly skewed. This gives an illustration of the distribution of discards. Note that discards are only estimated in a ten-minute square with both observed trips and reported kept catch. This is more of an issue with sink gillnet gear than trawl gear, as the distribution of observed hauls does not cover the range of reported kept catches (see Figure 20).

The estimated discards by ten-minute square were further analyzed to identify statistically-significant "hotspots" – areas with higher or lower discards than the region as a whole. ArcGis© includes an analytic tool which calculates these areas. As described by the software "This tool identifies statistically significant spatial clusters of high values (hot spots) and low values (cold spots)." The tool uses a spatial statistic called the Getis - Ord G* statistic. It does not identify isolated features with a high or low value; it identifies features that have a high (or low) value that are surrounded by other features with a high (or low) value. These areas reflect a statistically significant departure from complete spatial randomness. These areas generally match areas with high d/kall ratios.

The use of the statistic requires the user to define the appropriate neighborhood for the analysis, and results can be sensitive to the choice of the neighborhood. For this analysis the neighborhood was defined with a fixed distance of 25,000 meters, or roughly the eight squares surrounding each ten-minute square. This neighborhood scale was selected primarily because of a desire to use a scale that would allow for designing AM areas that were as small as possible. In addition, only ten minute squares with more than 10 or more observed tows were used in order to minimize effects of isolated observed tows. A sensitivity analysis was run using all squares for windowpane flounder and trawl gear; the results were not noticeably different than when all squares were included.

For wolffish and halibut a similar approach was followed. Because a larger proportion of the catches of these species were retained in recent years the approach was modified to use a catch/kall ratio for the observer data and kept catches of the species were combined with the estimated discards in each ten-minute square.

Once the hot-spot areas were plotted the AM areas were identified by drawing boundaries around a group of ten-minute squares that accounted for a desired reduction in catches. Because of data limitations with respect to the accuracy of reported fishing locations and the expectation that the areas would not be completely effective, they areas were drawn larger than would be expected if the data were completely accurate and compliance was 100 percent. The area boundaries may be adjusted in the future as experience is gained on the effectiveness of the AM system.

The figures following this discussion are the output from the analyses.

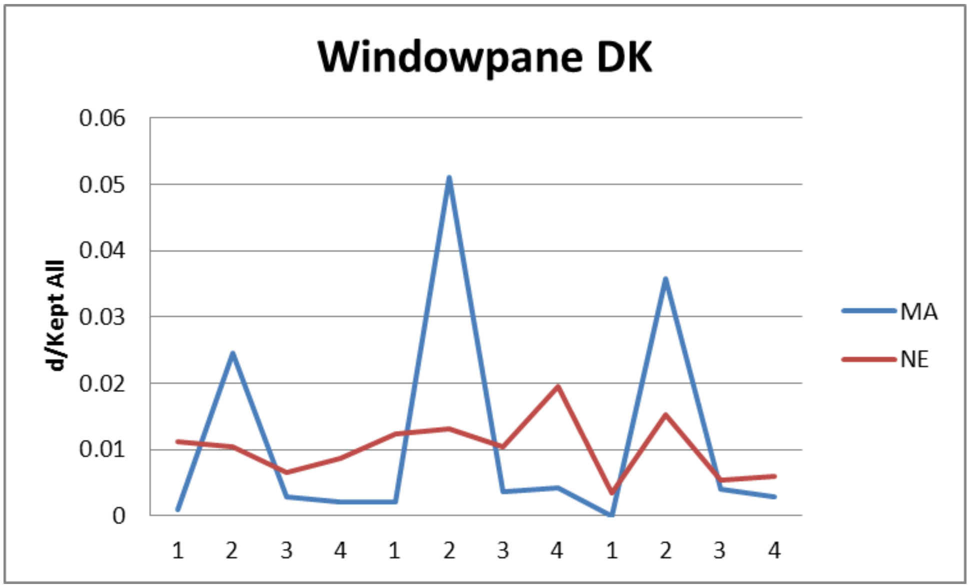
Additional Analyses

The preceding section describes the method used to identify the AM areas. A second approach applied regression trees to windowpane flounder during development of the areas. The results from this approach were consistent and are documented in PDT reports, while not as detailed as the GIS analyse..

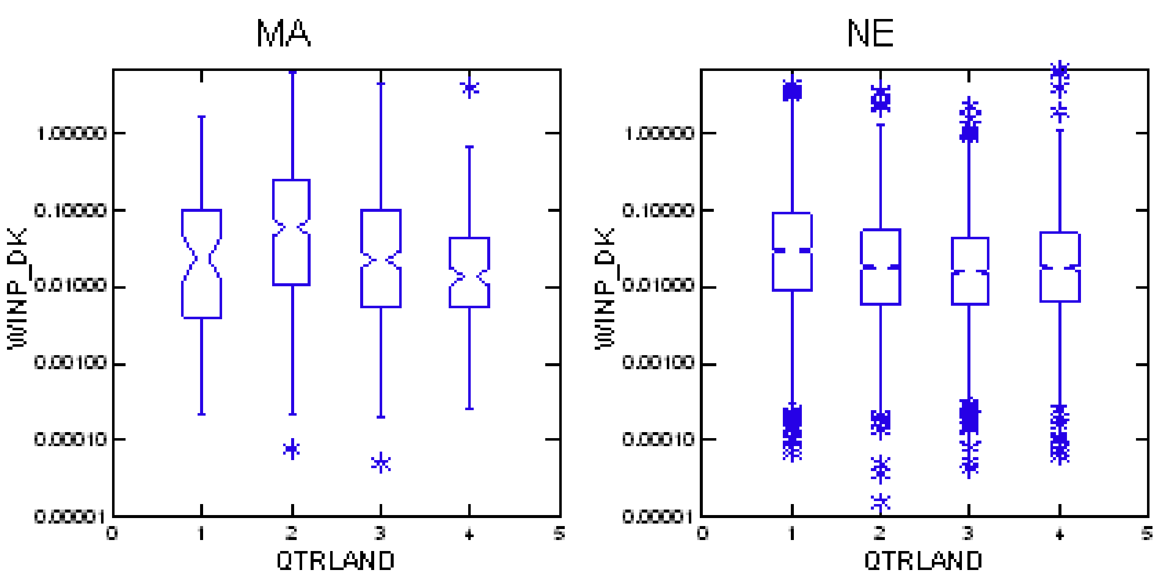
As noted, the analyses used pooled data. Since discard rates may change seasonally within a year, the observer data were analyzed to see if there were different discard rates in each quarter.

The following plot shows the simple windowpane observed sum discards/sum kept all ratio, by quarter, for large mesh otter trawls from 2008 – 2010. The two lines represent trips departing from NE ports and from MA ports (not area fished).

Note there seems to be a clear pattern for trips from MA ports with the ratio peaking in the second quarter. But there does not seem to be as obvious a pattern for trips leaving from NE ports.



The same l data were used for these box plots but were analyzed differently. These charts summarize the discard/kept all ratios on **individual tows** for tows that discarded windowpane flounder (note log scale). There still seems to be an increase in the second quarter for trips departing from MA ports. For NE ports, there might be a suggestion of a higher rate in the first quarter but it is not as pronounced as for the MA ports. The distributions overlap quite a bit, though.



Charts were plotted (not included here) that show the d/Kall ratios by ten minute square and quarter for large mesh otter trawls (050). All data are pooled for the years 2008 – 2010. The data include some tows coded as gear 050 but using an excluder device such as a separator. The ratio is a simple sum of discards divided by the sum of the total kept on observed tows in each ten-minute square. With windowpane flounder on GB there do not appear to be large differences in the observed discard ratios over the four quarters. In the GOM, however, ratios seem higher in the first quarter in the inshore area. There are few squares in SNE that have more than nine tows, making it difficult to draw conclusions

For ocean pout, ratios on GB appear higher in the second and possibly the third quarters, and lower in the first and fourth quarters. The inshore GOM seems to follow an opposite pattern. Again, the lack of observations in SNE makes it difficult to draw conclusions.

Wolffish discard ratios appear to be lowest in the first quarter. In the inshore GOM the ratios appear higher in the third quarter, but there does not seem to be much difference between the second through fourth quarters. It is difficult to detect much seasonality in the discard ratios for halibut. For sink gillnet gear, wolffish were not observed in sink gillnet tows at all in the first quarter. The second and third quarter seemed to have the highest catch/ kept all ratios.

Literature Cited:

Murawski, S. A., Wigley, S. E., Fogarty, M. J., Rago, P. J., and Mountain, D. G. 2005. Effort distribution and catch patterns adjacent to temperate MPAs. ICES Journal of Marine Science, 62: 1150-1167.

Murray KT. 2007. Estimated bycatch of loggerhead sea turtles (*Caretta caretta*) in U.S. Mid-Atlantic scallop trawl gear, 2004-2005, and in sea scallop dredge gear, 2005. US Dep Commer, Northeast Fish Sci Cent Ref Doc 07-04; 30 p.

Palmer, Michael C. and Wigley, Susan E. 2009. Using Positional Data from Vessel Monitoring Systems to Validate the Logbook-Reported Area Fished and the Stock Allocation of Commercial Fisheries Landings. North American Journal of Fisheries Management, Vol. 29, Issue 4, 2009.

Figure 1 – Number of observed large mesh otter trawl tows, by ten-minute square, 2008 and later

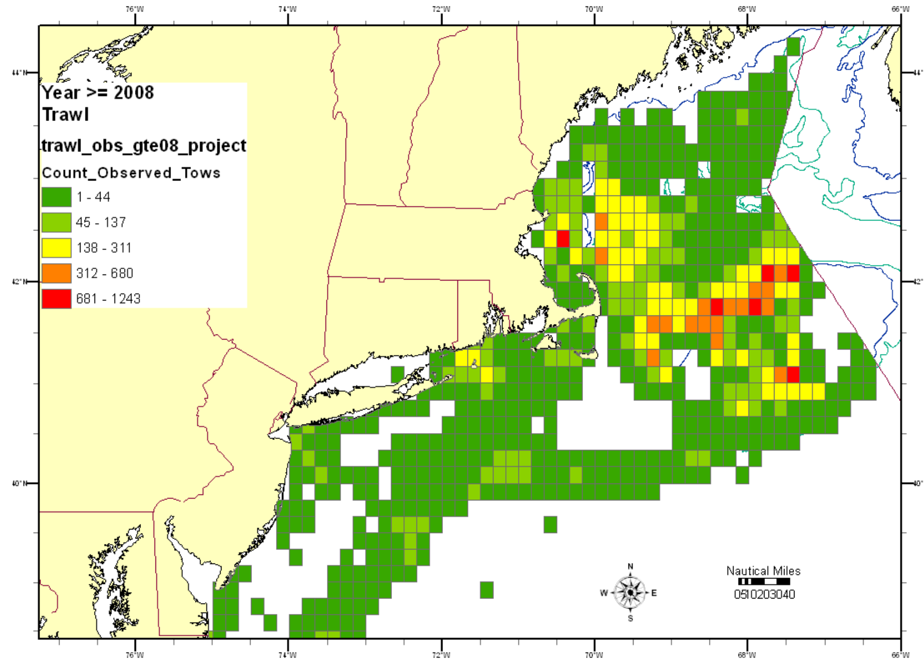


Figure 2 – Observed large mesh otter trawl discards of windowpane flounder. Colors binned by quintile of total observed squares.

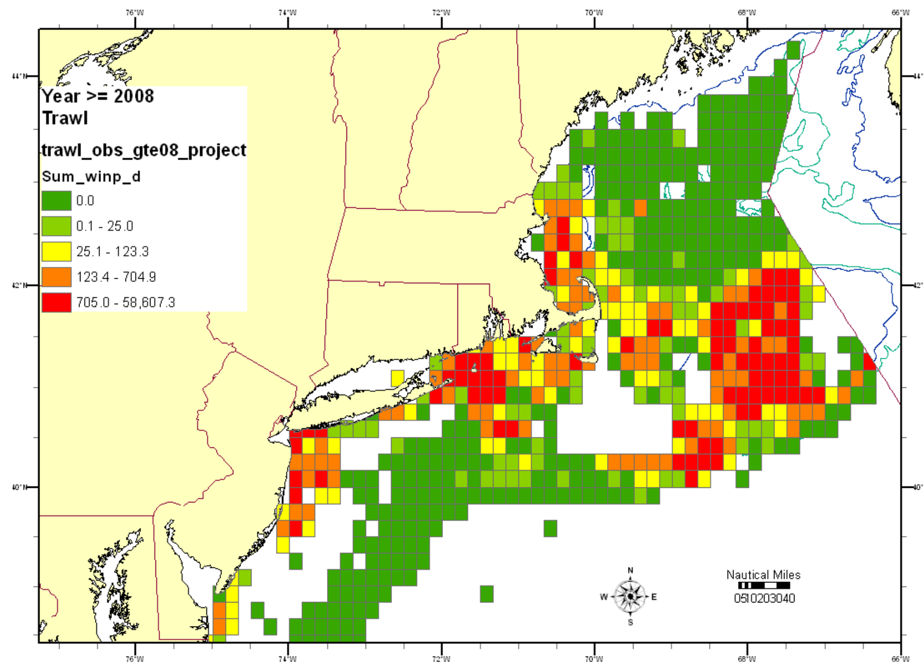


Figure 3 – Large mesh otter trawl windowpane flounder discard to kept all ratio, by ten minute squares

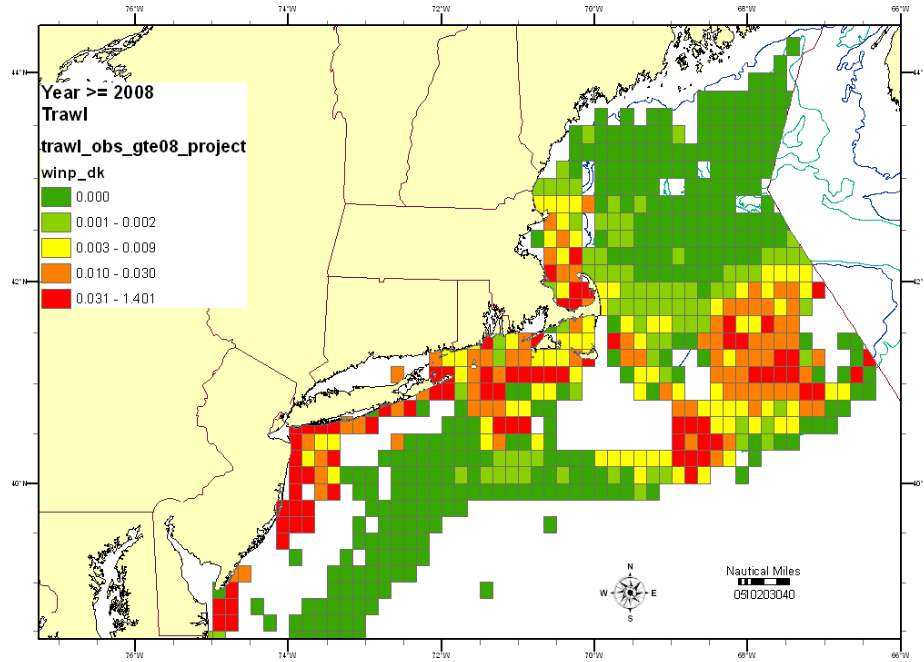


Figure 4 – Large mesh otter trawl expanded discards of windowpane flounder

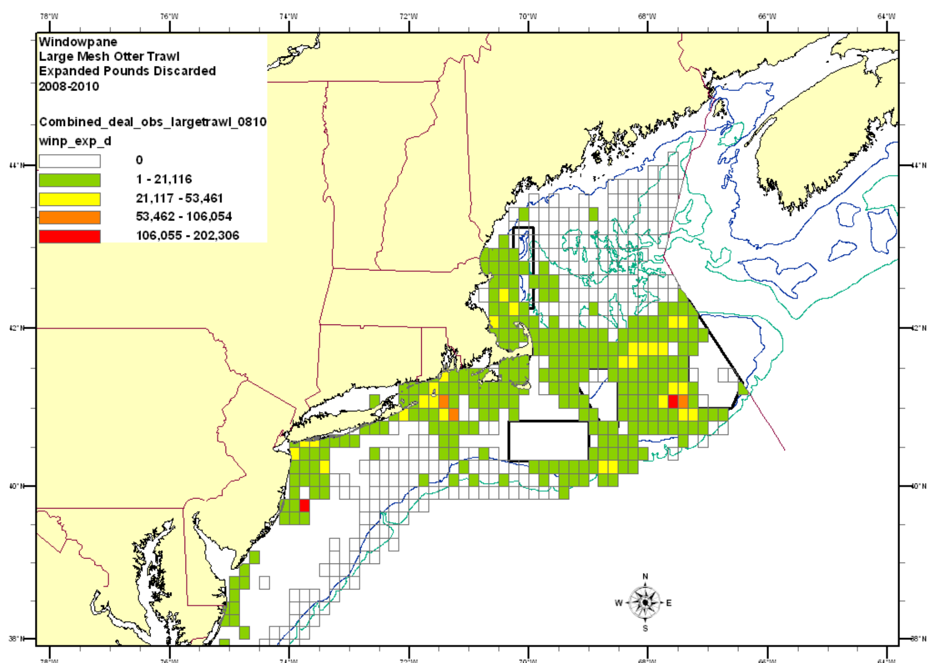


Figure 5 – Large mesh otter trawl expanded discards of windowpane flounder (log scale)

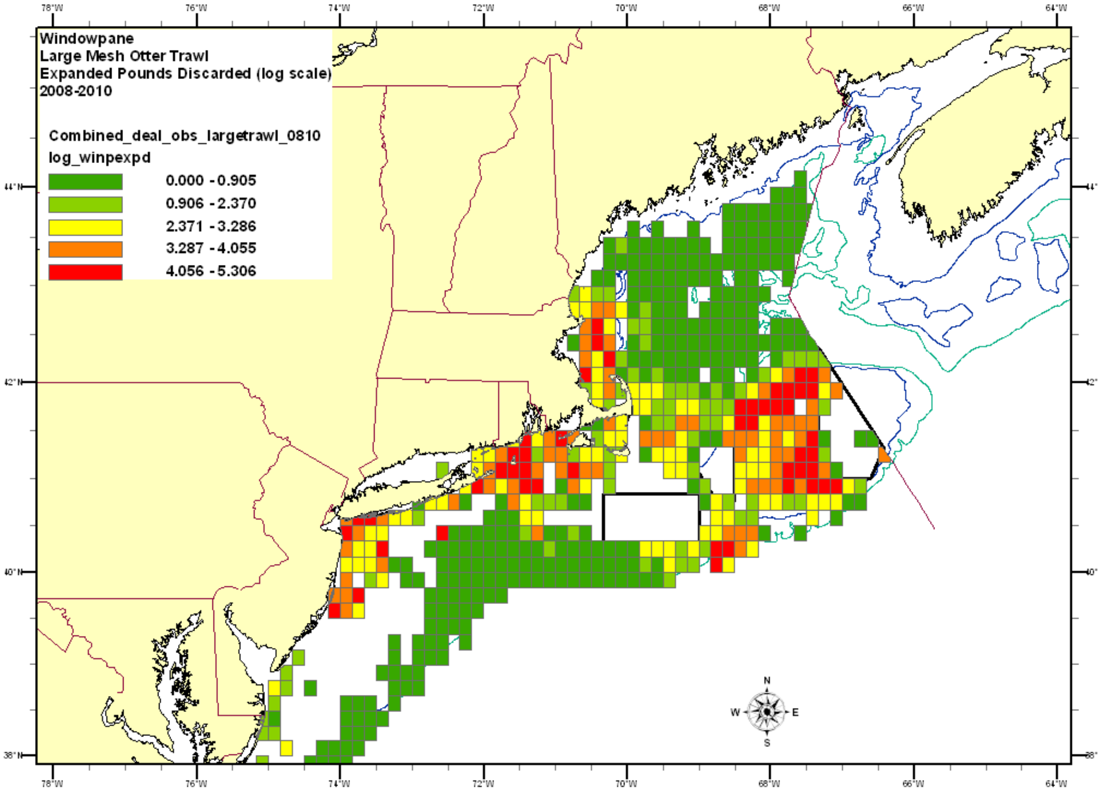


Figure 6 – Getis Gi* hotspots for large mesh otter trawl expanded discards of windowpane flounder, all observed tows.

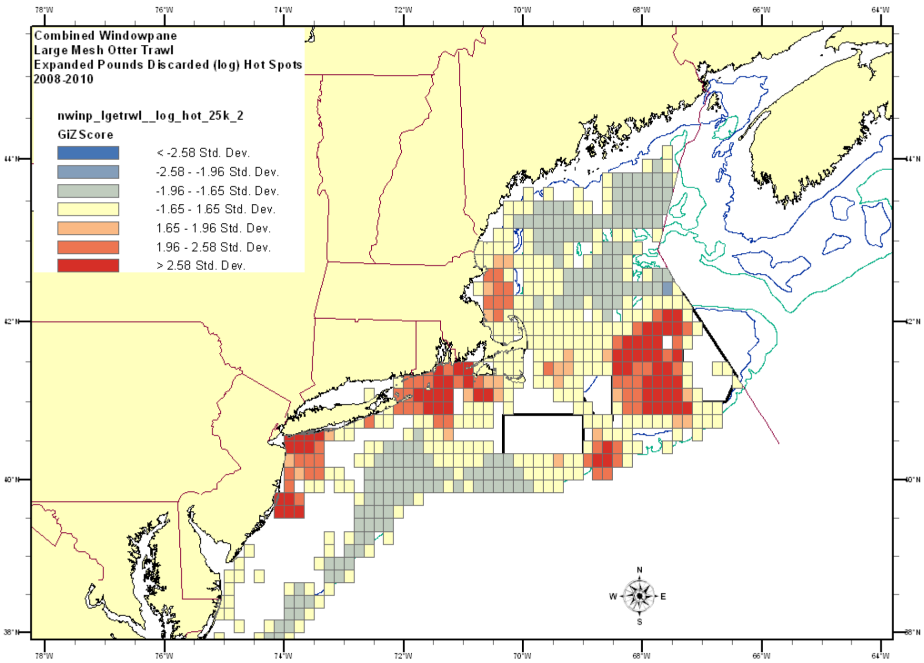


Figure 7 – Getis Gi* hotspots for large mesh otter trawl expanded discards of windowpane flounder, 10 or more observed tows in a ten-minute square

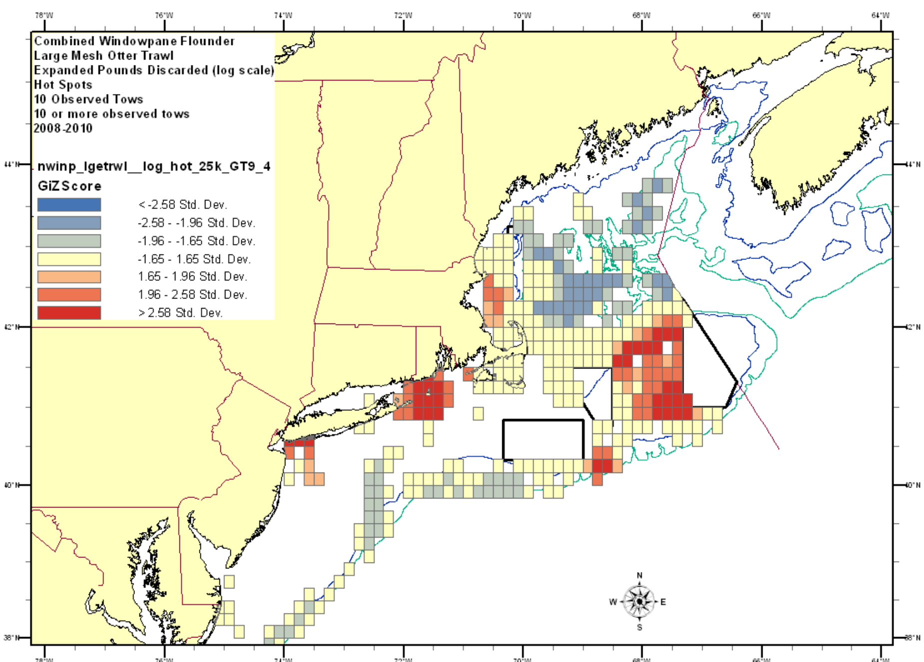


Figure 8 – Large mesh otter trawl expanded discards of ocean pout, 2008 - 2010

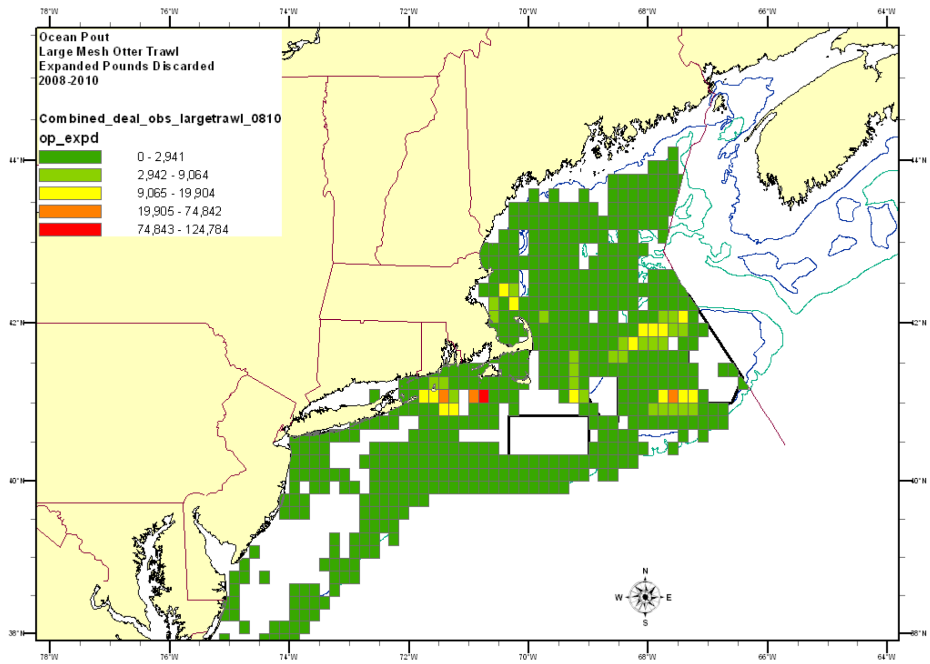


Figure 9 – Large mesh otter trawl expanded discards of ocean pout (log scale), 2008 - 2010

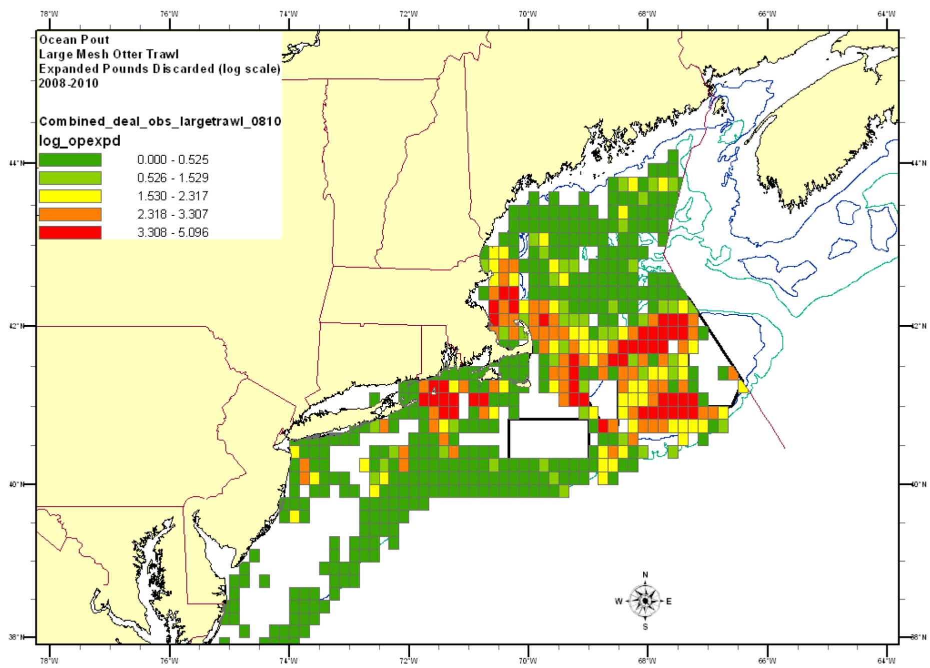


Figure 10 - – Getis Gi* hotspots for large mesh otter trawl expanded discards of ocean pout, all observed tows.

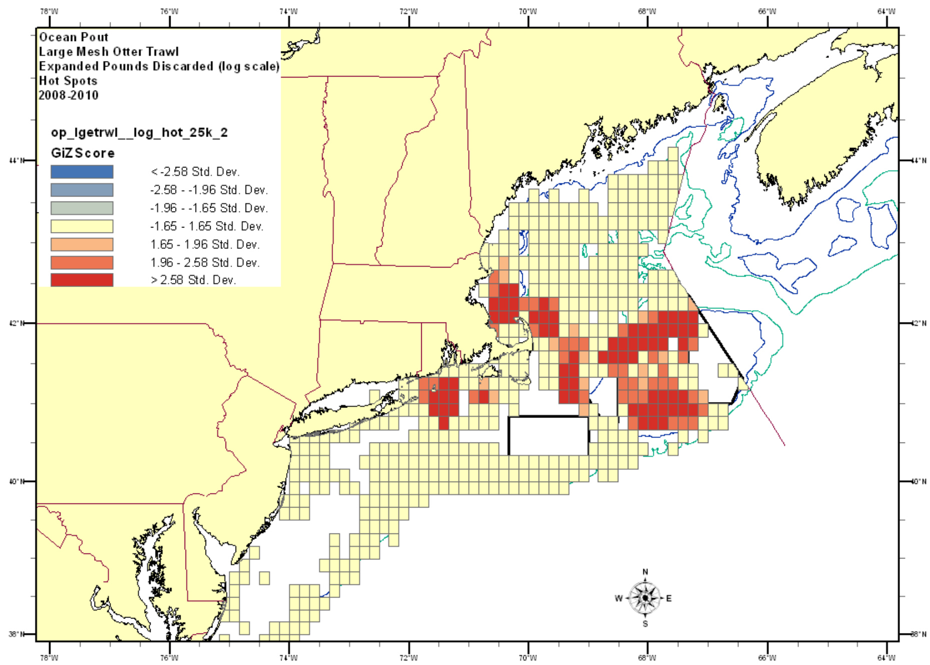


Figure 11 - Getis Gi* hotspots for large mesh otter trawl expanded discards of ocean pout, 10 or more observed tows in each ten-minute square

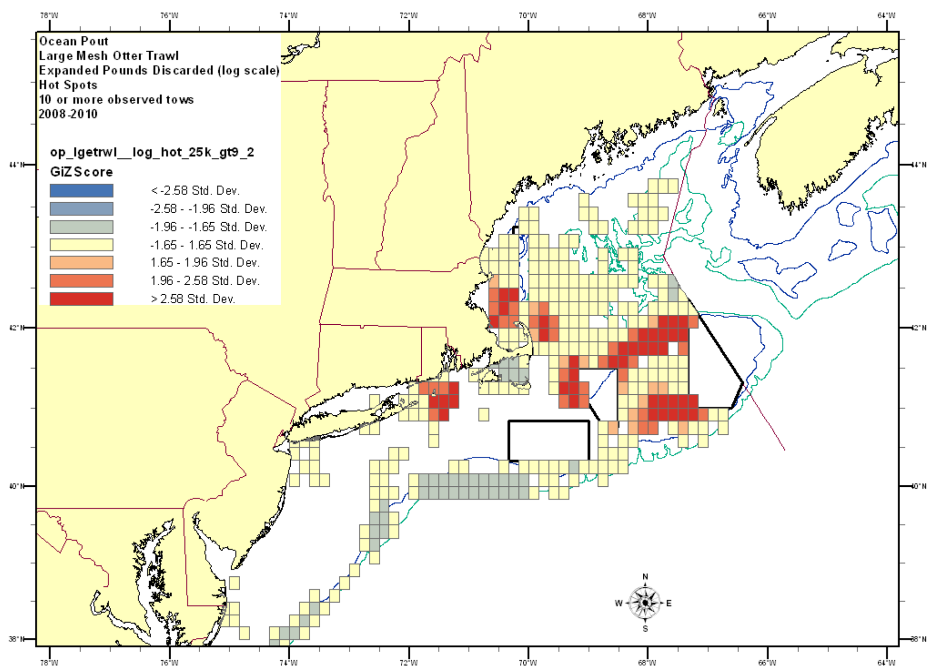


Figure 12 – Large mesh otter trawl catches of Atlantic halibut (reported kept catch plus expanded discards)

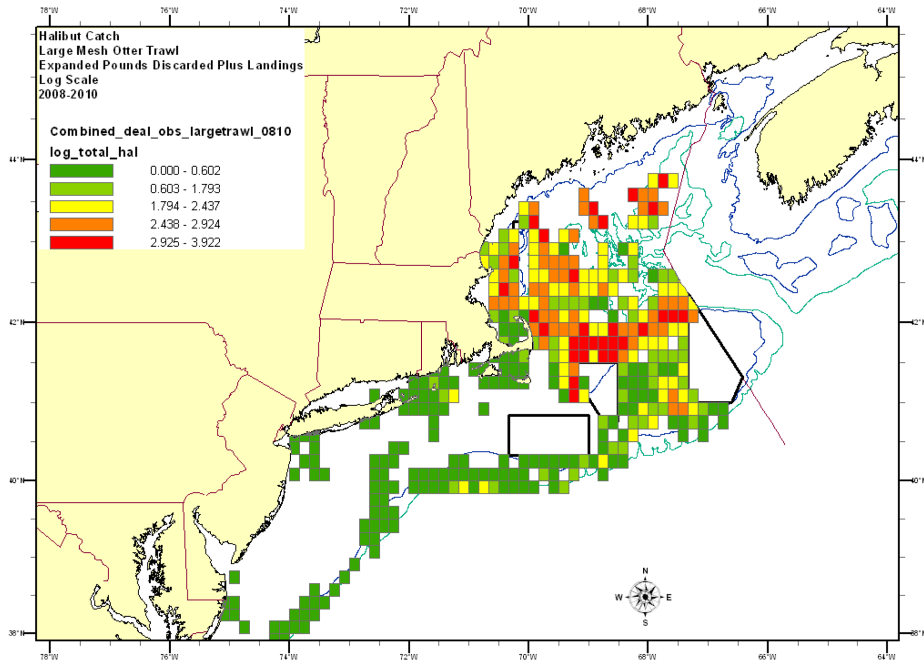


Figure 13 - – Large mesh otter trawl catches of Atlantic halibut (reported kept catch plus expanded discards), log scale

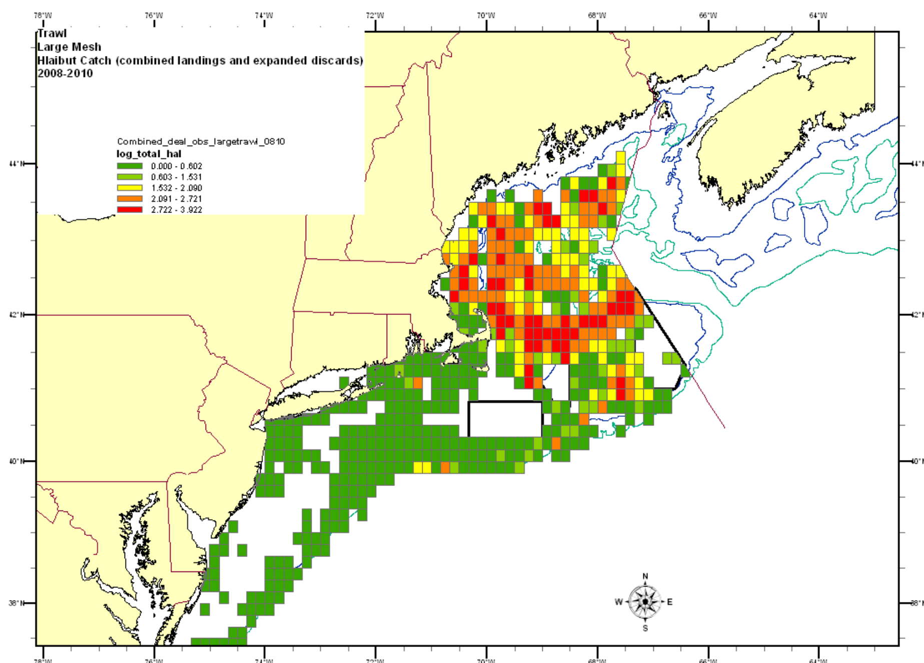


Figure 14 - Getis Gi* hotspots for large mesh otter trawl catch of halibut, all observed tows

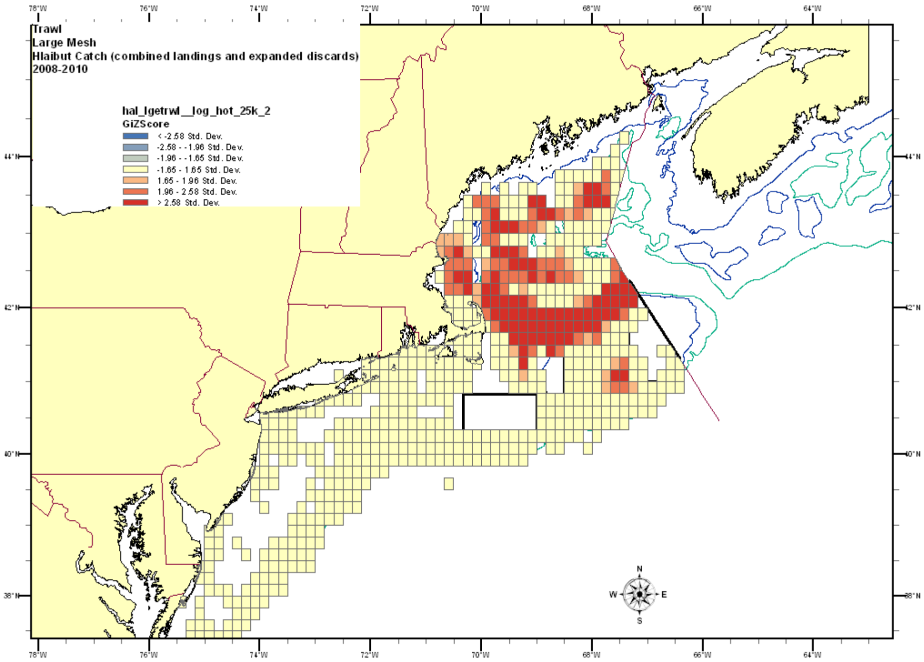


Figure 15 - Getis Gi* hotspots for large mesh otter trawl catch of halibut, 10 or more observed tows in each ten-minute square

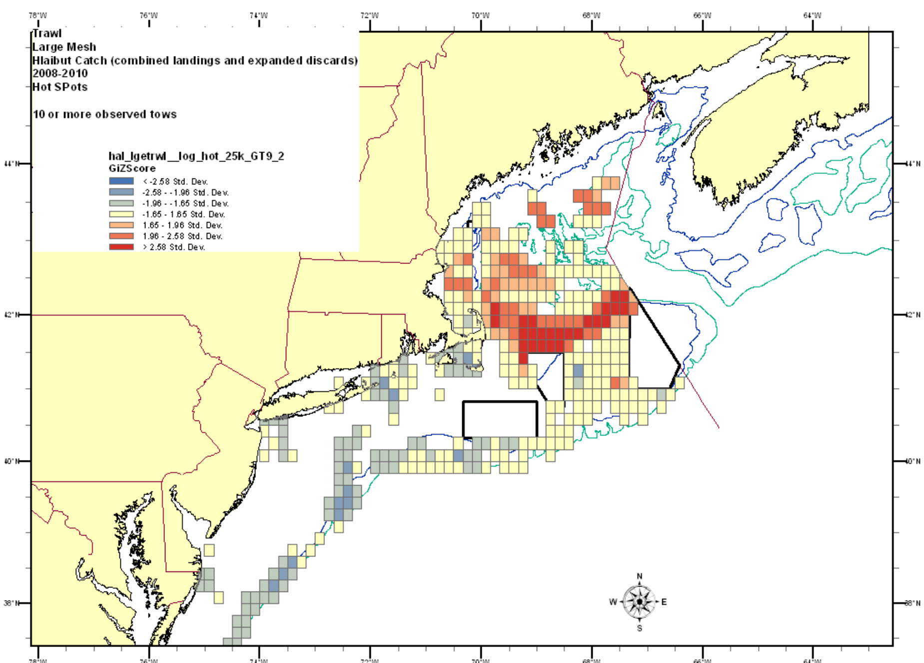


Figure 16 – Large mesh otter trawl Atlantic wolffish catch (landings plus expanded discards)

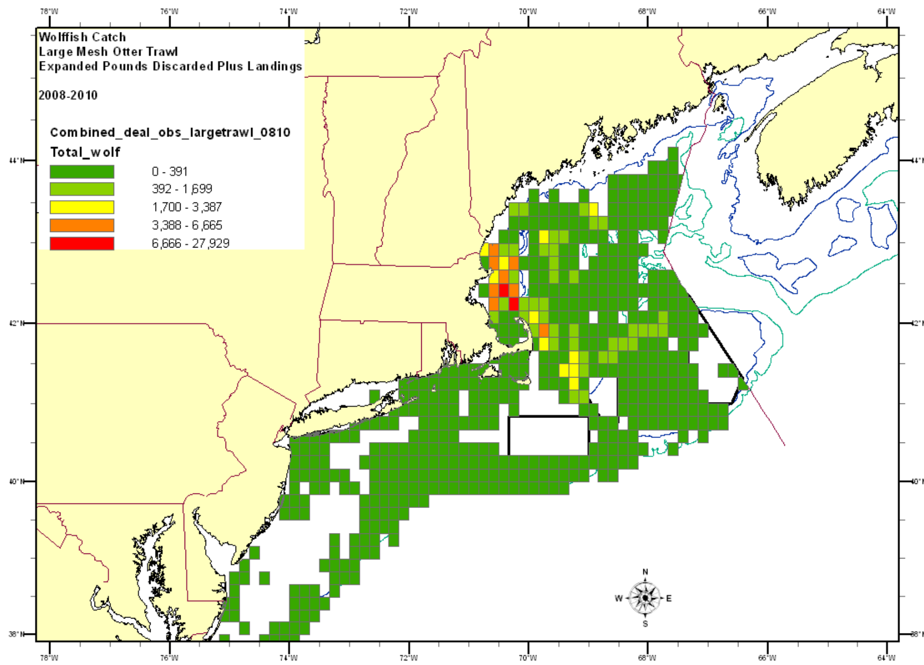


Figure 17 – Large mesh otter trawl Atlantic wolffish catch (landings plus expanded discards), log scale

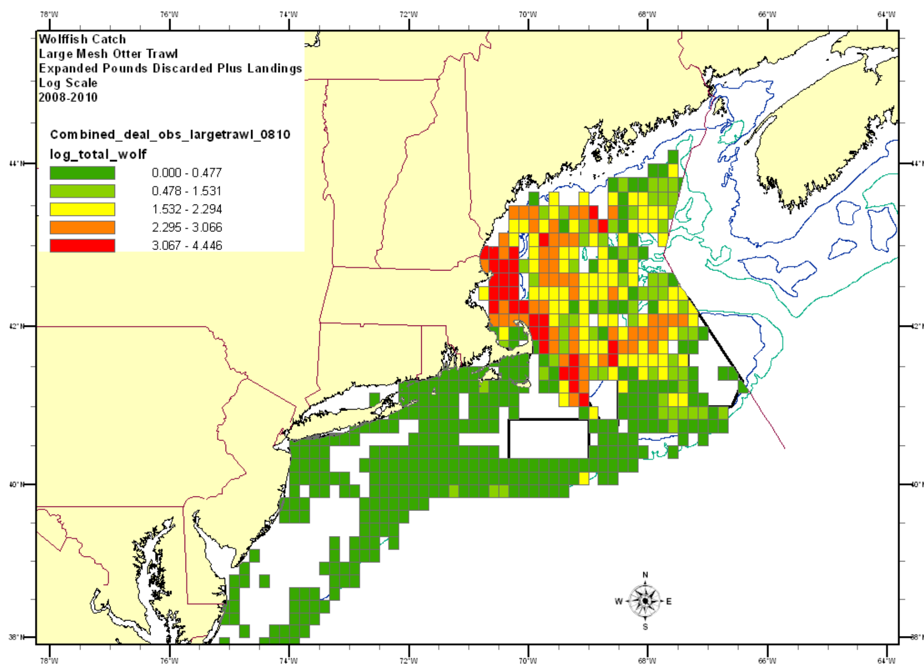


Figure 18 - - Getis Gi* hotspots for large mesh otter trawl expanded catch of wolffish, all observed tows

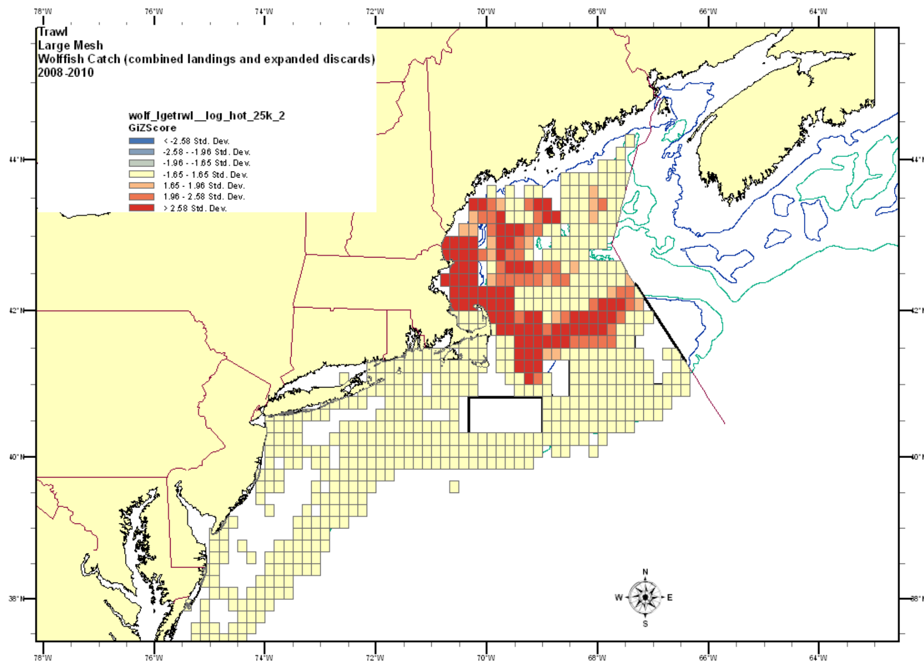


Figure 19 - Getis Gi* hotspots for large mesh otter trawl catch wolffish, 10 or more observed tows in each ten-minute square

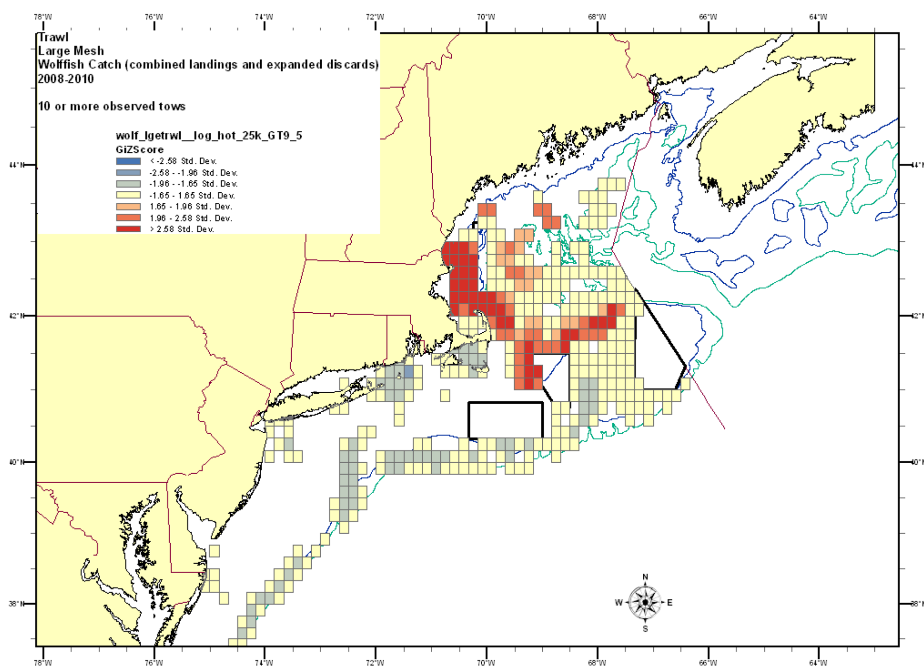


Figure 20 – Observed large and extra-large mesh sink gillnet hauls plotted over sink gillnet reported kept catch by ten-minute square, 2008 - 2010

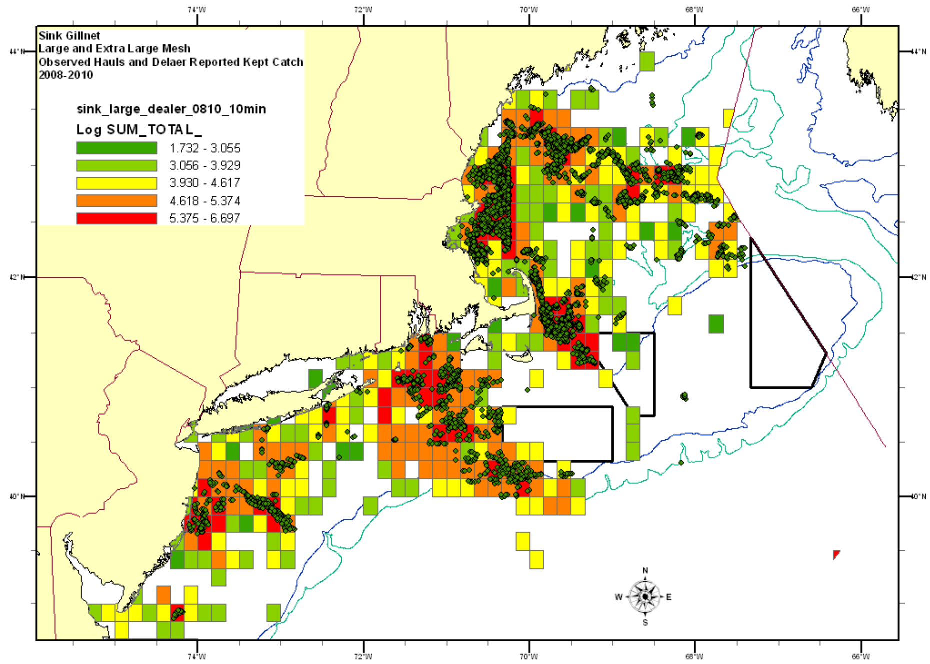


Figure 21 – Sink gillnet catch, areas with 10 or more observed tows, 2008 - 2010

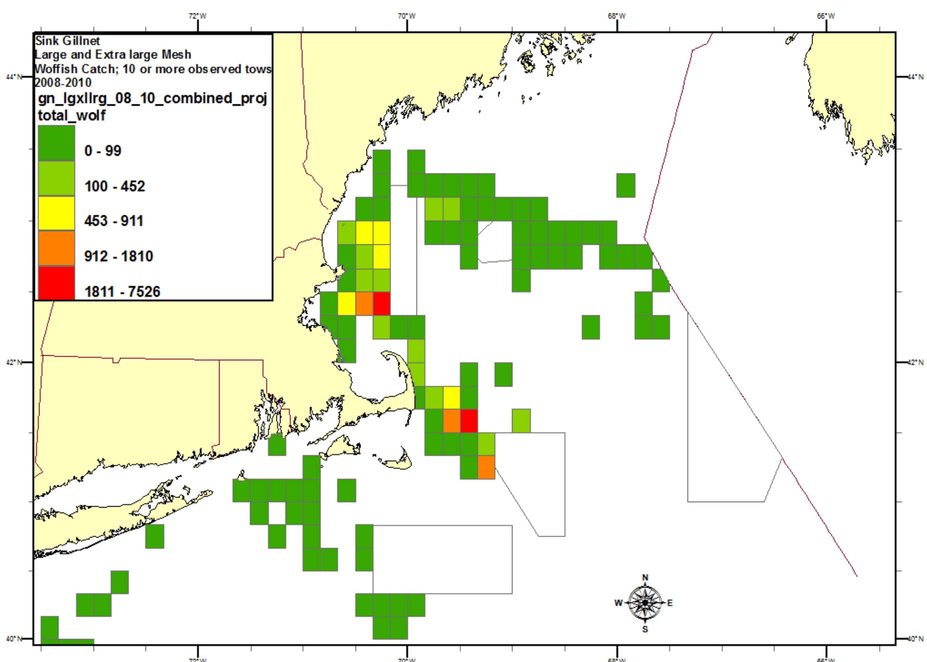


Figure 22 – Sink gillnet catch, areas with 10 or more observed tows, log scale, 2008 - 2010

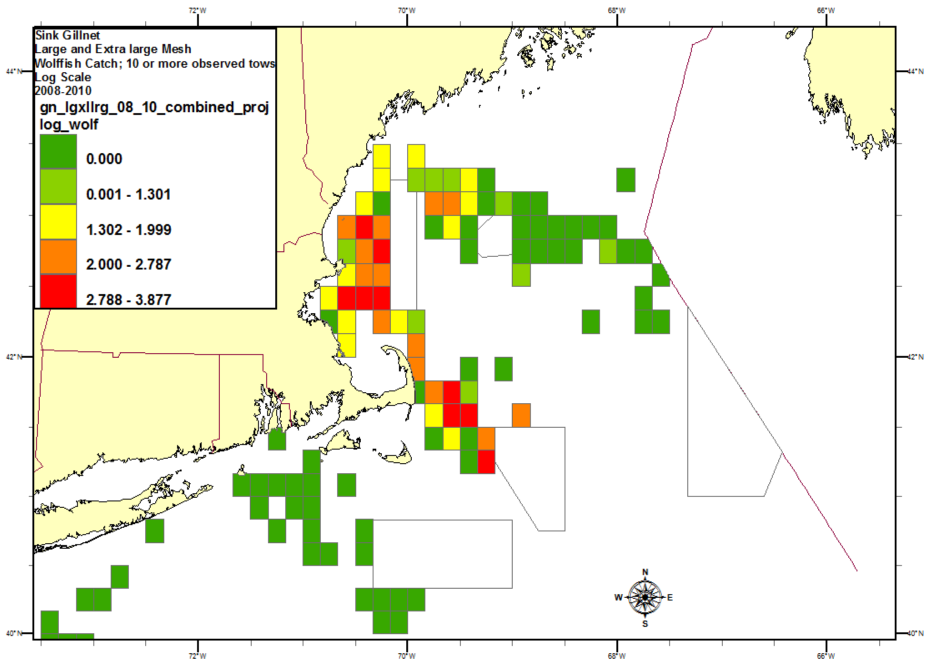


Figure 23 – Sink gillnet wolffish hotspots, areas with ten or more observed tows only, 2008 - 2010

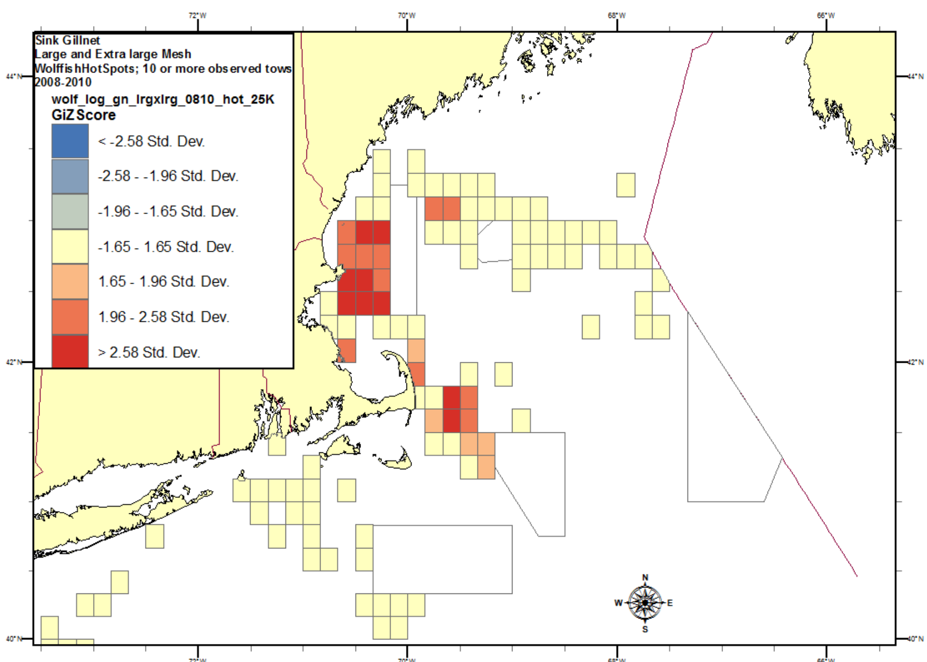


Figure 24 – Sink gillnet halibut catch, areas with ten or more observed tows, 2008 -2010

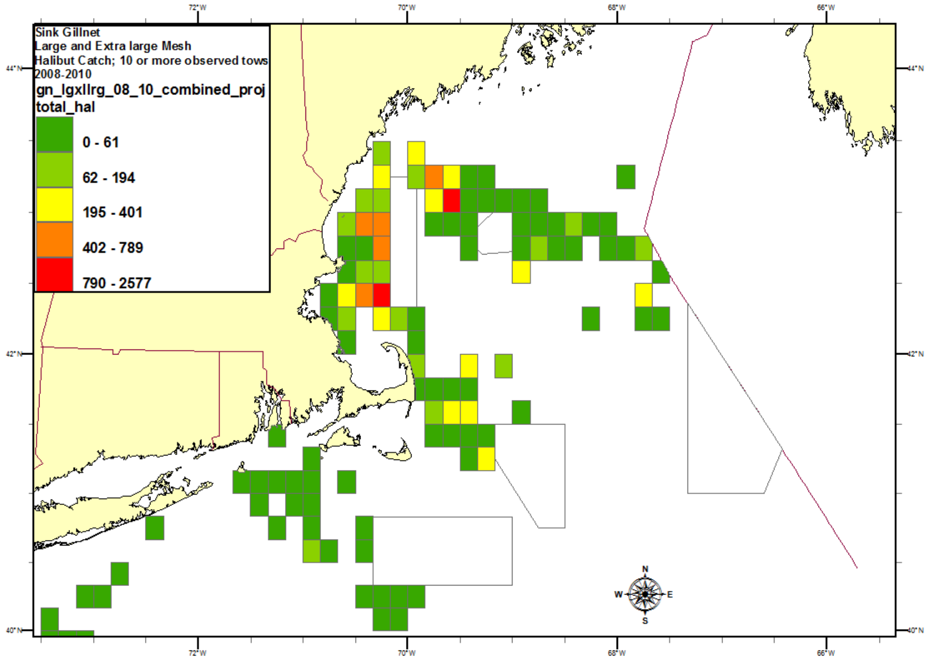


Figure 25 – Sink gillnet halibut catch, log scale, areas with ten or more observed tows, 2008 -2010

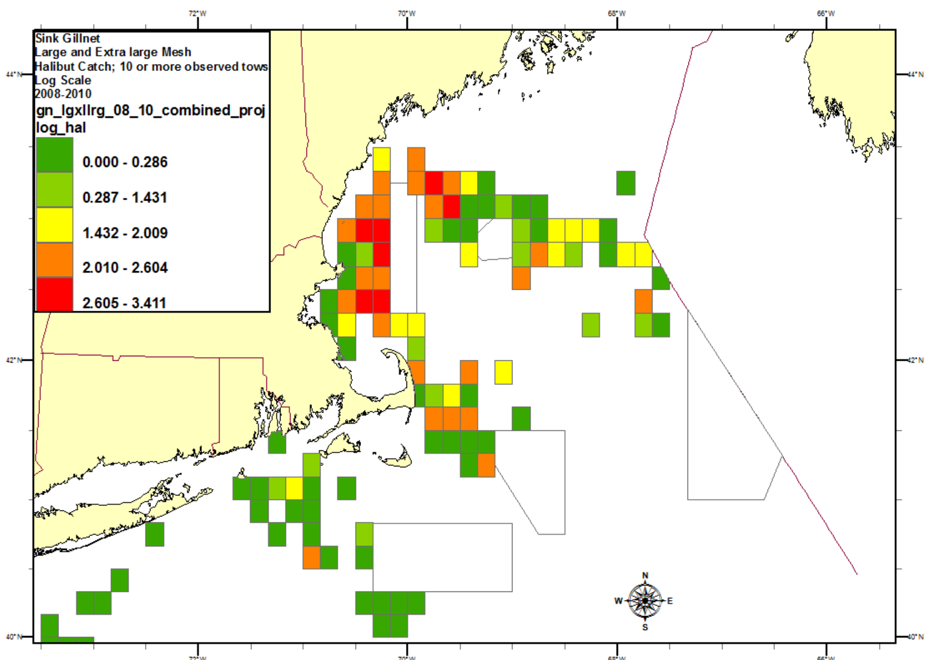
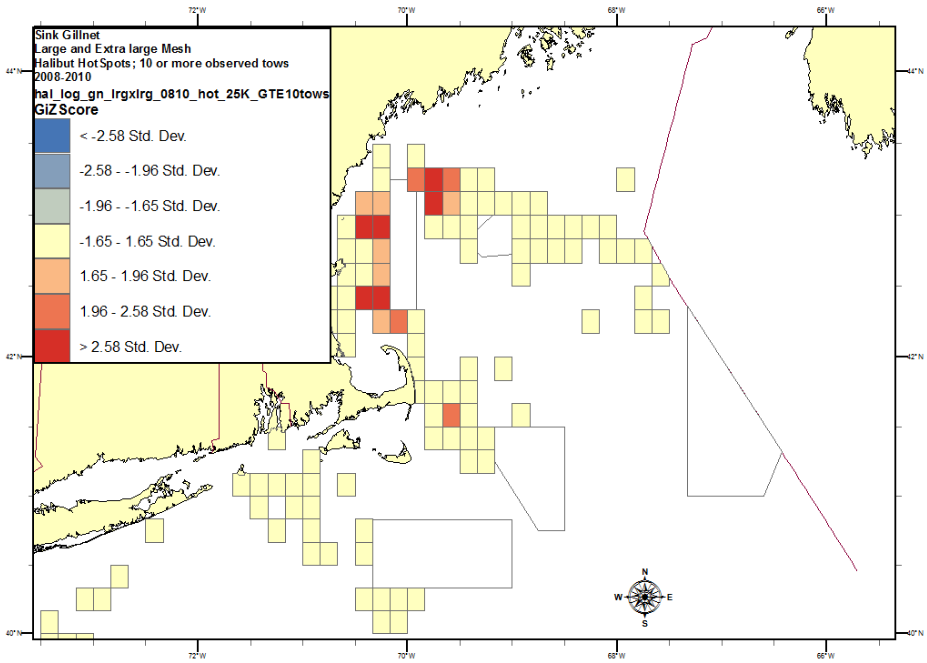


Figure 26 – Sink gillnet halibut hotspots, areas with ten or more observed tows, 2008 - 2010



Identifying hotspots of windowpane discard using regression tree analyses on windowpane discards per tow and proportion of tows with windowpane

Developed for the groundfish PDT

by

Steven Correia
Massachusetts Division of Marine Fisheries
July 19, 2011

I used regression trees to identify geographic areas with high and low proportion of tows with windowpane or log10 discards of windowpane per tow. Tom Nies provided a dataset of observed tows. The analysis was based on tow observations. Total discards were estimated by multiplying the discard rate (discard (species)/ (kept all) by the kept hailweight. Tow observations were treated as independent, that is the correlation of tows within trips was ignored. All analyses were completed on at tow level, and the distribution of observed effort or fleet effort was not taken into account in this analysis.

Tree regression proceeds by binary recursive partitioning of the predictor variables in order to minimize the variance within each split and maximize the difference in mean between the two splits. The use of latitude and negative longitude as variables results in the creation of rectangles with homogeneous catches.

Proportion of tows with windowpane.

Tows were coded as having windowpane (1) or no windowpane(0). The overall proportion of tows with windowpane over the entire study area was 0.30. The proportion of tows with windowpane is plotted against latitude and negative longitude (Figure 27 and Figure 28). The plot suggests that the highest proportion of positive tows with windowpane occur between 41 and 42 degrees north latitude and west of 70 degrees longitude and east of 69 degrees longitude.

I used a tree regression of presence/ absence of windowpane in tow with negative longitude and latitude as predictor variables. The full tree was pruned using 10-fold cross-validation and a complexity parameter chosen using the 1 standard deviation rule on the average error from cross-validation. The pruned tree is shown in Figure 28 and explains 29.9% of the deviance. Fitted proportions were derived using gridded area defined by latitude 35.5 to 44.3 in 0.1 degree increments and longitude (-75.7 to -63.6, in 0.1 degree increments. Note that portions of this area do not contain observed trips. The fitted proportion positive tows are shown as level plots in Figure 29. Tow locations are shown in Figure 30. Areas with relatively high proportion of tows with windowpane are western Georges Bank, Southern New England near Long Island and the Nantucket Light ship area and inshore western Gulf of Maine.

Catch of windowpane weight per tow

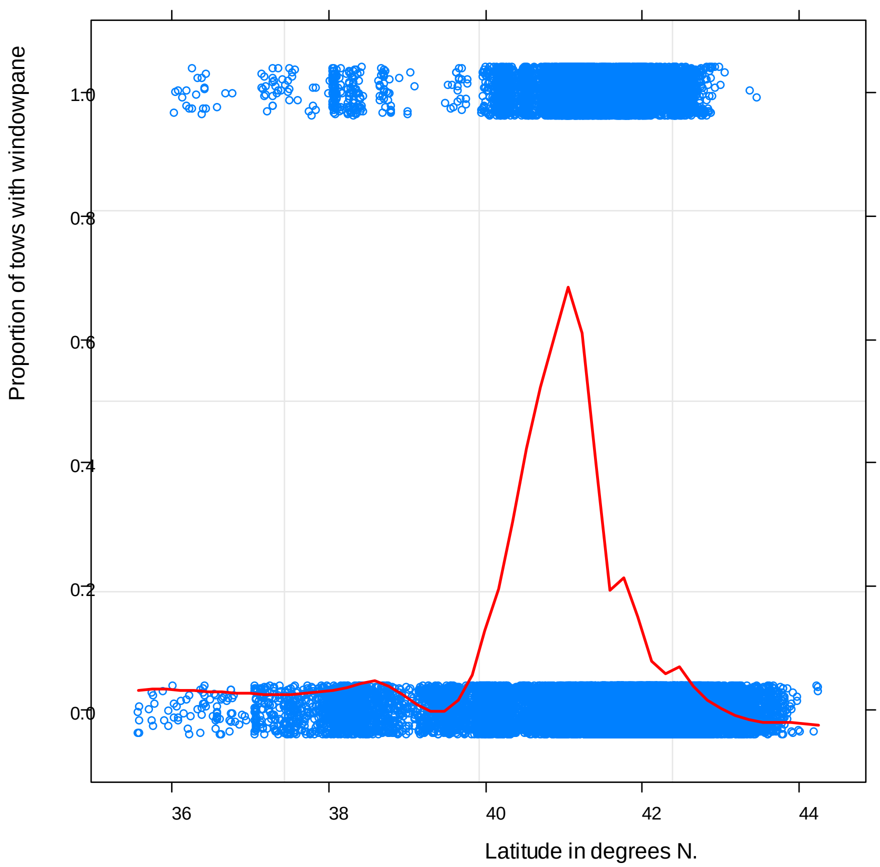
Windowpane are generally caught in small quantities, and 75% of tows with windowpane discards are 38 lb or less. However, the distribution is highly skewed right and tows with large amount of windowpane occur but are relatively rare. For example, the 90th quantile is 94 lb, the 99th quantile is 363, and the 99.9 is 1018 lb. Boxplots of the windowpane catch by bins of latitude and longitude are shown in Figure 31 and Figure 32. The Large contrast in the median or iterquartile range is not apparent in either the bins of latitiude or longitude. Bins with high number of observations do tend to have more observations at the tails than bins with fewer observations.

I used a regression tree to log10 windowpane discards using the same method applied to the proportion of tows. This analysis included tows with zero observations. The pruned tree is shown in Figure 33 and explains 29.9% of the deviance. Fitted proportions were derived using gridded area defined by latitude 35.5 to 44.3 in 0.1 degree increments and longitude (-75.7 to -63.6, in 0.1 degree increments. Note that portions of this area do not contain observed trips. An attempt to fit a regression tree to only tows with windowpane was unsuccessful, likely a result of lack of contrast in the observations.

The fitted proportion positive tows are shown as level plots in Figure 34. Tow locations are shown in Figure 30. Results are similar to areas identified with proportions. Given the lack of contrast in distribution of discards in the positive tows and skewness in the distribution, the proportion of zero tows is having a large influence on the analysis. The fitted values are highest off Long Island (7.0 lb per tow) and Southern Georges (5.6 lb per tow) and Georges Bank (3.7).

Comparison with spatial statistics analysis.
These areas identified as high and low discards generally correspond to area's identified Tom Nies's high-low clustering analysis using Getis-Ord G statistics.

Implications for using area management as an accountability measure.
The regression tree analyses identified areas with high and low proportion of tows with windowpane and also areas with high and low discard per tow. These results would need to be scaled by expected effort in order to be useful for defining areas to use as accountability measure. Additionally, the effects of redistributing effort to non- AM on windowpane discards needs consideration. The lack of contrast in the distribution of discarded windowpane suggests that areas may need to be larger rather than smaller to reduce windowpane discards and may reduce the economic yield from other groundfish species.


Proportion of tows with windowpane
1.0
0.8
0.6
0.4
0.2
0.0
36
38
40
42
44
Latitude in degrees N.

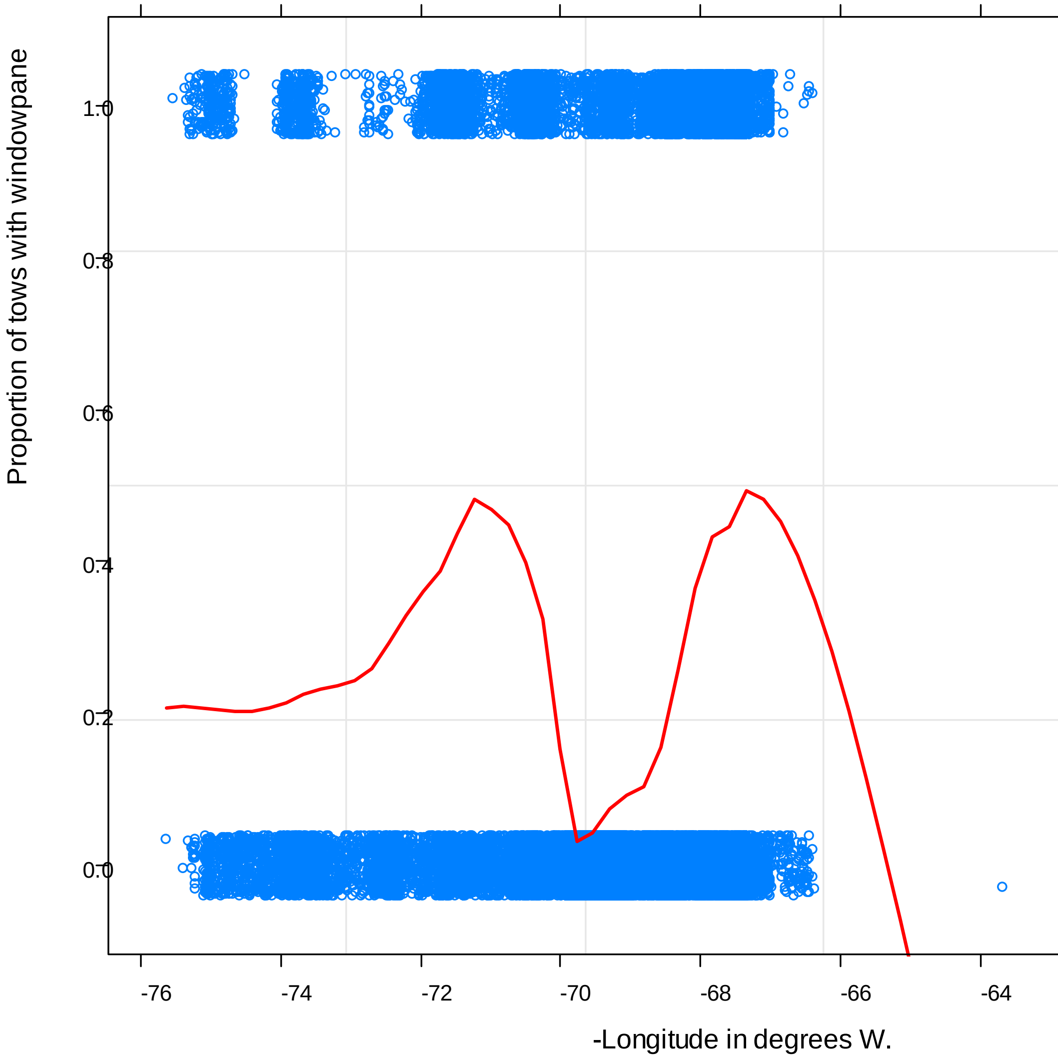


Figure 27. Proportion of tows with windowpane against beginning longitude. Red line is loess with span=0.2 and degree=1 and represents proportion positive tows. Blue dots are jittered presence (1)/ absence (0) of windowpane.

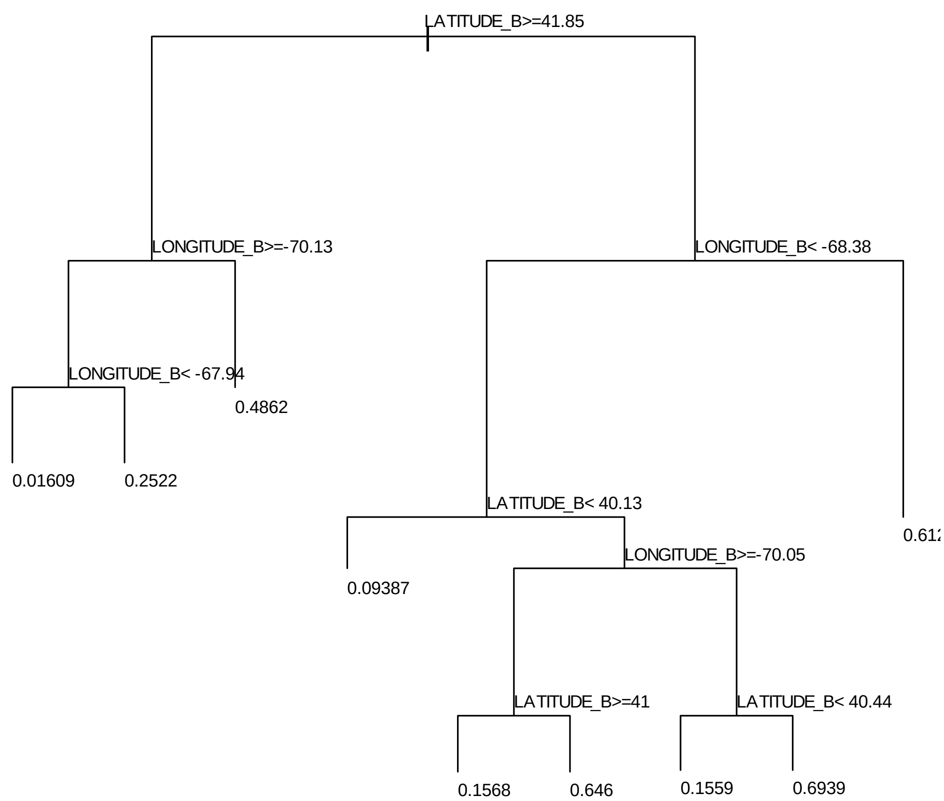


Figure 28. Partition tree for presence/absence (proportion) of windowpane in observed tows. Pruned tree using xerror+1 standard deviation as cut off criterion. Numbers at end of splits are fitted proportion of tows with windowpane.

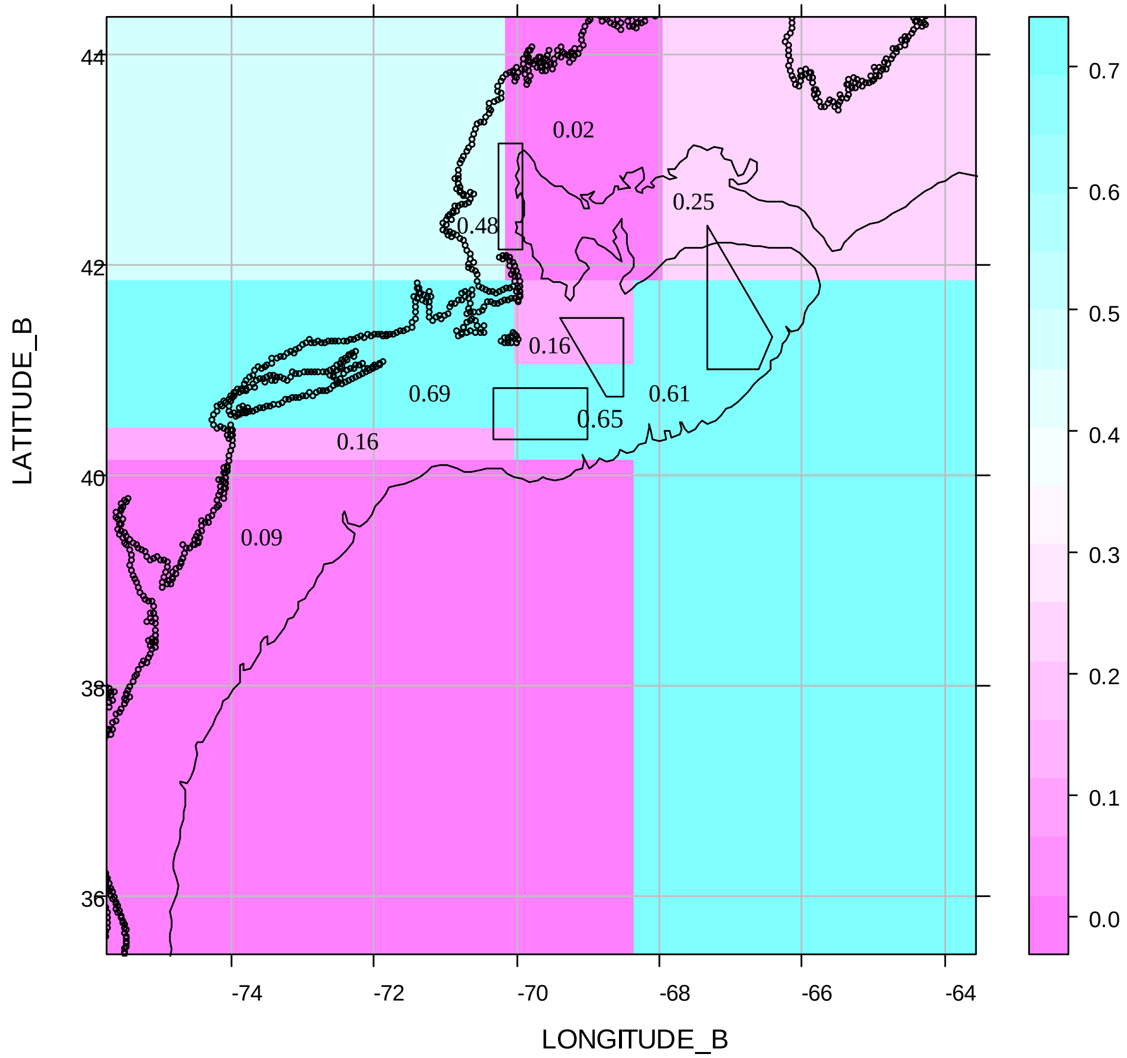


Figure 29. Levelplot of predicted proportion positive tows from tree regression based on latitude and longitude. Number within shaded area is proportion positive tows. Note that predicted values for areas without data should be ignored (see Figure 30 for location of tows) .

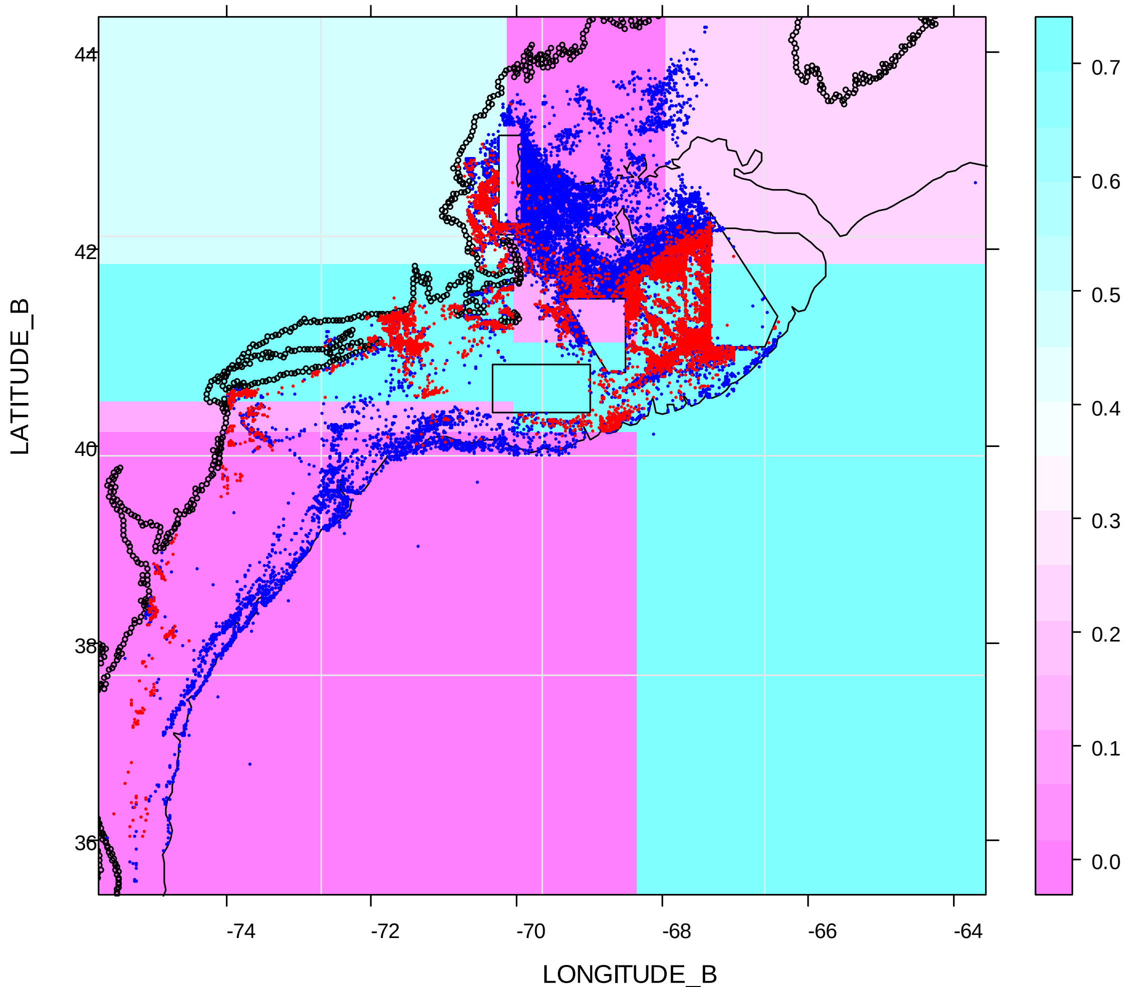


Figure 30. Same as Figure 3 but with observed tows (blue=no windowpane, red=windowpane observed). Colored regions coded to represent proportion of tows with windowpane (see scale on right).

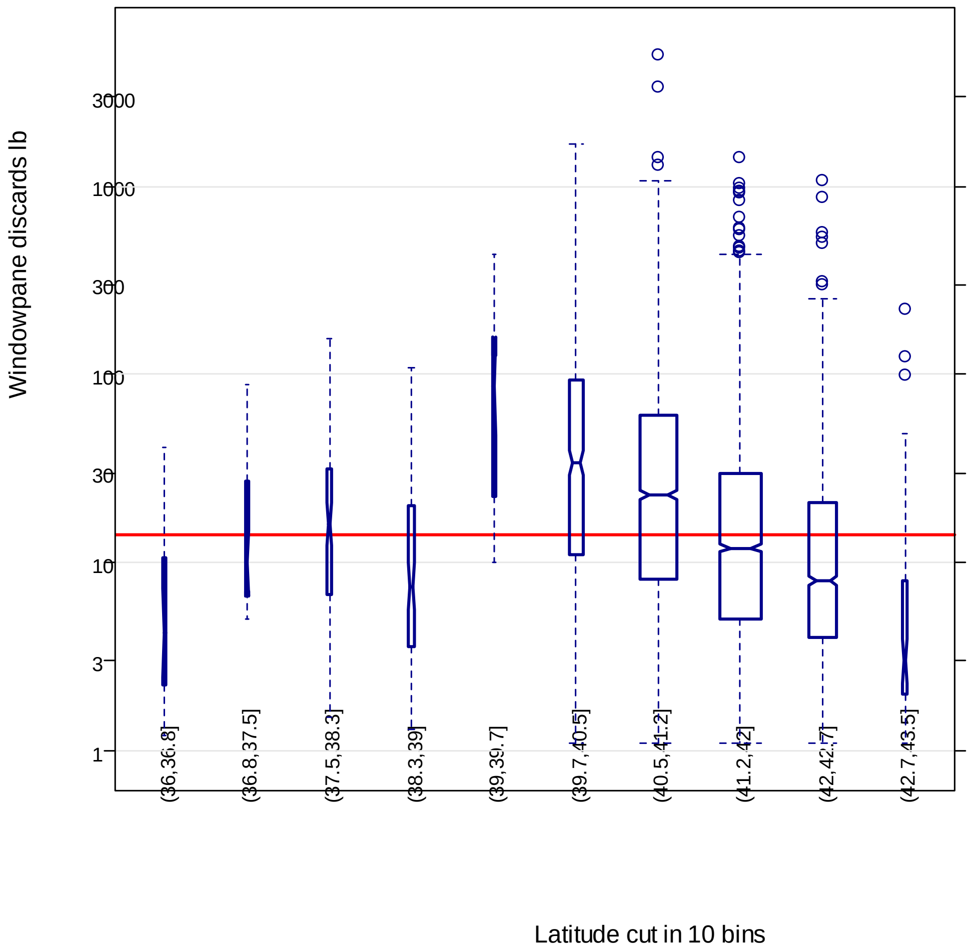


Figure 31. Boxplots of windowpane catch per tow (lb) by 10 bins of latitude. Zero tows not included. Width of box is proportional to square root of the number of observations. Red line is overall median. Note that y axis scale is logarithmic.

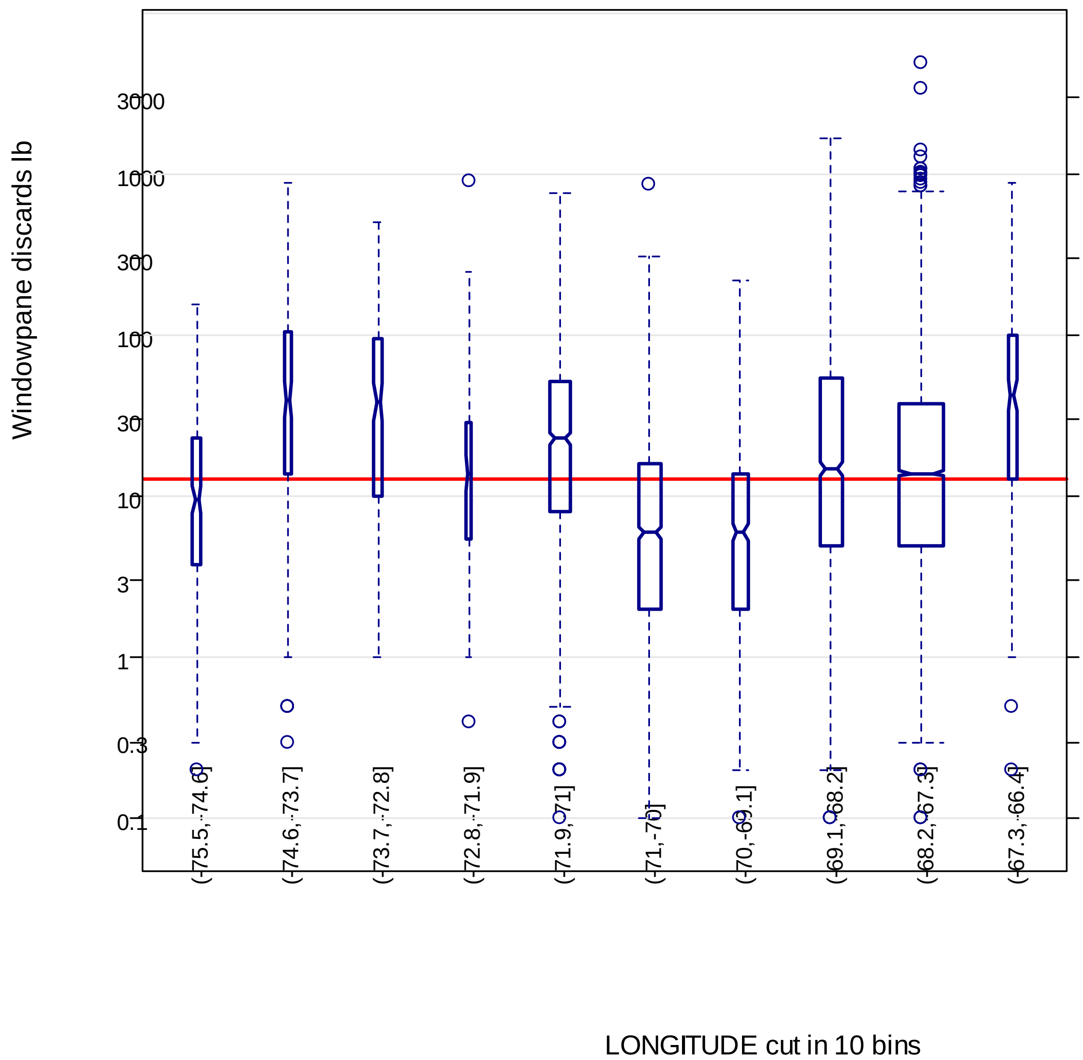


Figure 32. Boxplots of windowpane catch per tow (lb) by 10 bins of negative longitude. Zero tows not included. Width of box is proportional to square root of the number of observations. Red line is overall median. Note that y axis scale is logarithmic.

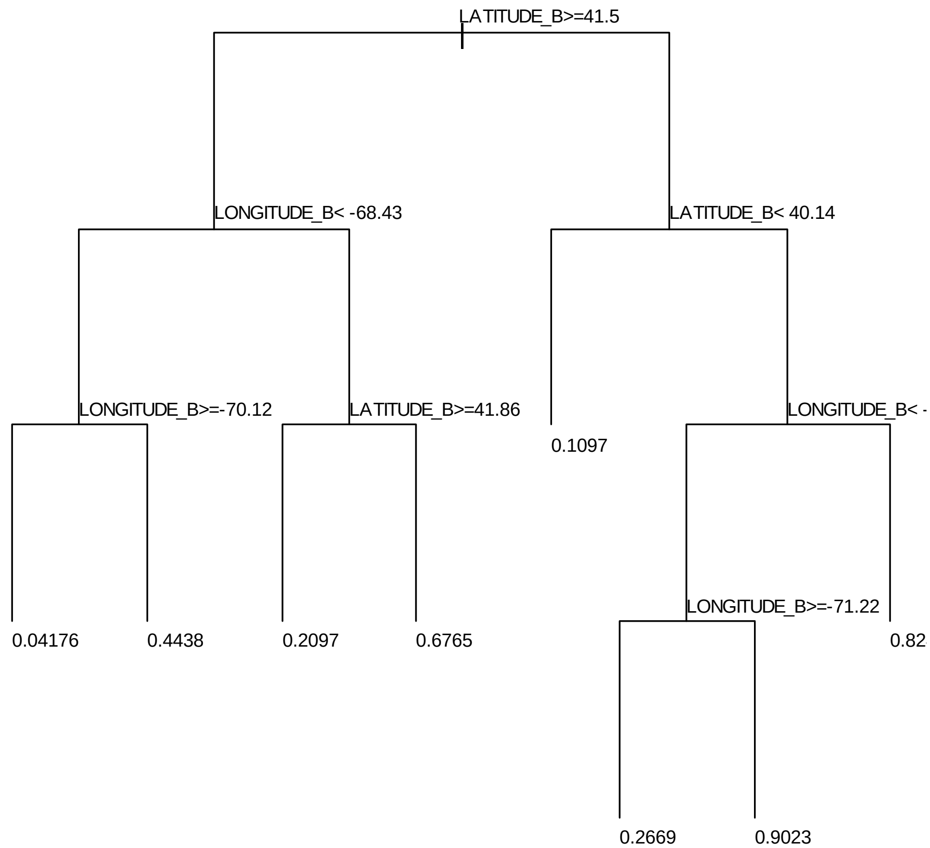


Figure 33. Pruned tree from regressing log10 windowpane discards against negative longitude and latitude. Numbers at end of leaves are log10 windowpane discards in lb.

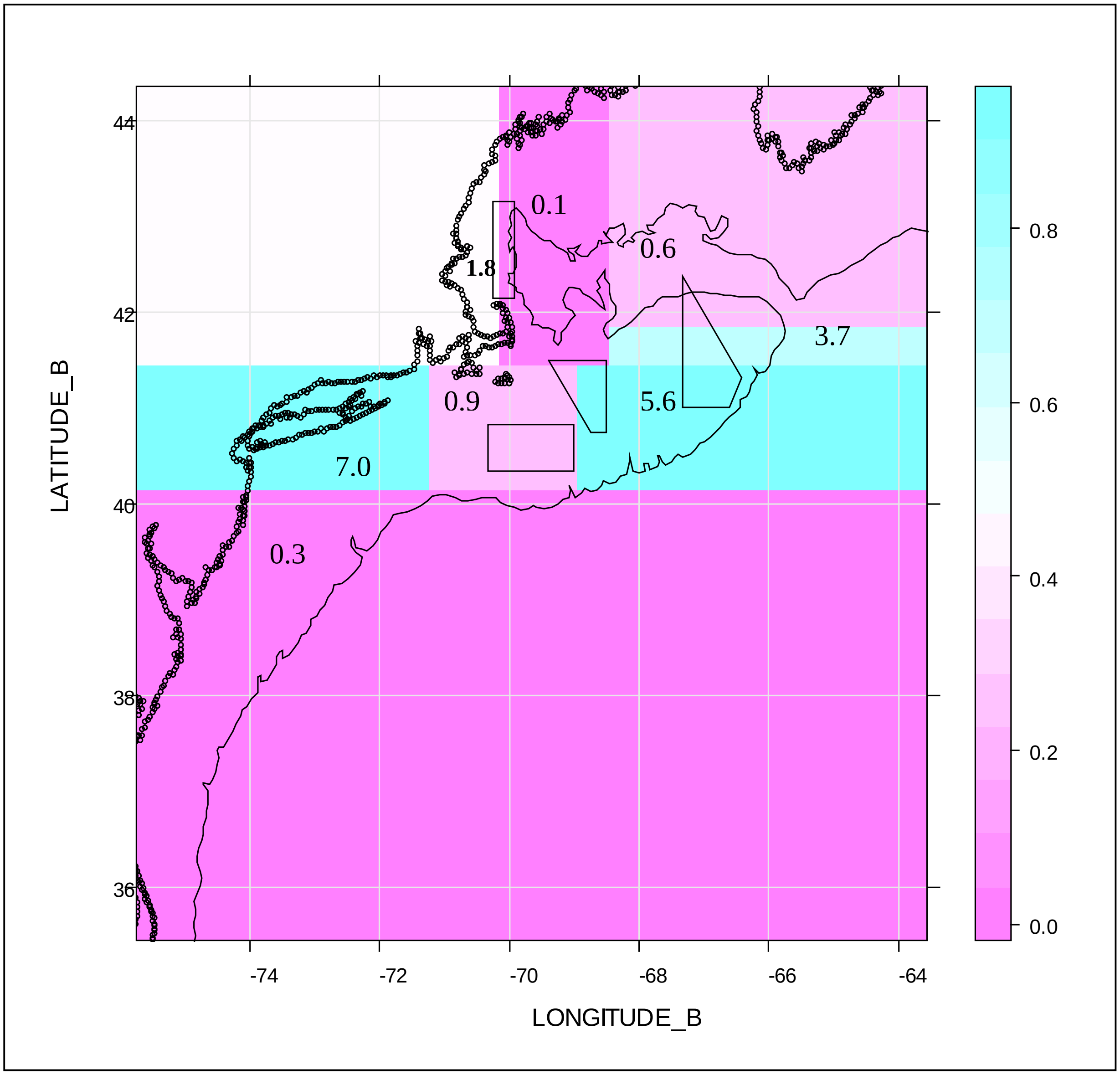

0.1
0.6
1.8
3.7
0.9
5.6
7.0
0.3
44
42
40
38
36
-74
-72
-70
-68
-66
-64
LONGITUDE_B
LATITUDE_B
0.8
0.6
0.4
0.2
0.0

Figure 34. Levelplot of tree regression of log10 windowpane dk* hailwt +1 lb. Numbers within the chart are the back-transformed geometric mean catch (lb). Scale on right bar is in common logs. Note that predicted values for areas without data should be ignored (see Figure 30 for location of tows)

Framework Adjustment 47

To the

Northeast Multispecies FMP

Appendix V

ABC Projection Output

SNE/MA Winter Flounder

AGEPRO VERSION 3.3

PROJECTION RUN: 2011 SARC 52 SNE WFL: CAT10 Projected FMSY

INPUT FILE:
C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\JSNEWIN\SARC52\PDT_CAT10_AVG09_10_F_STATUSQUO2011.IN
OUTPUT FILE:
C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\JSNEWIN\SARC52\PDT_CAT10_AVG09_10_F_STATUSQUO2011.OUT
NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION: 100
TOTAL NUMBER OF SIMULATIONS: 100000
NUMBER OF FEASIBLE SIMULATIONS: 100000
PROPORTION OF SIMULATIONS THAT ARE FEASIBLE: 1.00000000000000
NUMBER OF BOOTSTRAP REALIZATIONS: 1000

NUMBER OF RECRUITMENT MODELS: 1
PROBABLE RECRUITMENT MODELS: 5
RECRUITMENT MODELS BY YEAR

YEAR	RECRUITMENT MODELS
2011	5
2012	5
2013	5
2014	5
2015	5
2016	5
2017	5
2018	5
2019	5
2020	5

RECRUITMENT MODEL PROBABILITIES BY YEAR

YEAR	MODEL PROBABILITY
2011	1.00000000000000
2012	1.00000000000000
2013	1.00000000000000
2014	1.00000000000000
2015	1.00000000000000
2016	1.00000000000000
2017	1.00000000000000
2018	1.00000000000000
2019	1.00000000000000
2020	1.00000000000000

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2011	100000
2012	100000
2013	100000
2014	100000

2015	100000
2016	100000
2017	100000
2018	100000
2019	100000
2020	100000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2011		0.363
2012	0.070	
2013	0.070	
2014	0.070	
2015	0.070	
2016	0.070	
2017	0.070	
2018	0.070	
2019	0.070	
2020	0.070	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2011	9.333	0.844
2012	9.944	0.843
2013	10.535	0.886
2014	13.618	2.316
2015	18.145	4.090
2016	22.807	5.376
2017	27.793	6.626
2018	33.735	8.221
2019	39.821	9.801
2020	45.962	11.284

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	7.604	8.111	8.310	8.736	9.268	9.870	10.462	10.848	11.557
2012	8.206	8.673	8.920	9.358	9.850	10.478	11.096	11.437	12.090
2013	8.735	9.214	9.471	9.913	10.432	11.119	11.747	12.126	12.779
2014	9.984	10.712	11.158	12.018	13.209	14.740	16.554	17.911	21.261
2015	11.583	12.887	13.691	15.273	17.448	20.238	23.444	25.749	31.168
2016	13.730	15.602	16.768	18.986	21.990	25.722	29.855	32.755	39.227
2017	16.313	18.712	20.222	23.074	26.876	31.521	36.529	40.013	47.528
2018	19.333	22.363	24.276	27.896	32.625	38.402	44.578	48.697	58.062
2019	22.477	26.255	28.502	32.834	38.514	45.415	52.748	57.711	68.504
2020	25.868	30.258	32.899	37.917	44.496	52.480	60.809	66.617	78.803

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 43.661 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.003
2017	0.022
2018	0.116

2019	0.303
2020	0.531

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 0.532

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2011	12.697	1.055
2012	15.379	1.991
2013	20.925	4.442
2014	26.509	6.001
2015	32.204	7.422
2016	38.851	9.185
2017	46.398	11.207
2018	54.515	13.237
2019	62.489	14.983
2020	70.349	16.552

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	10.471	11.136	11.436	11.952	12.561	13.381	14.124	14.585	15.365
2012	11.971	12.734	13.170	13.991	15.086	16.431	17.916	18.989	21.618
2013	13.929	15.309	16.168	17.828	20.148	23.130	26.625	29.132	35.361
2014	16.516	18.557	19.828	22.257	25.562	29.706	34.342	37.594	45.053
2015	19.387	22.068	23.775	26.923	31.153	36.340	42.005	45.892	54.432
2016	22.801	26.180	28.321	32.329	37.595	44.037	50.964	55.568	65.894
2017	26.713	30.940	33.493	38.407	44.894	52.791	61.130	66.818	79.332
2018	30.964	36.135	39.208	45.095	52.748	62.114	71.972	78.641	93.238
2019	35.497	41.491	45.069	51.821	60.634	71.122	82.273	89.874	105.686
2020	40.258	46.831	50.978	58.513	68.404	79.961	92.178	100.461	117.687

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 43.661 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.001
2014	0.014
2015	0.075
2016	0.262
2017	0.548
2018	0.792
2019	0.922
2020	0.975

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 0.975

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	AVG F_WT_B	STD
2011	0.029	0.002
2012	0.041	0.004
2013	0.035	0.004
2014	0.036	0.004
2015	0.040	0.005
2016	0.042	0.005

2017	0.042	0.005
2018	0.042	0.004
2019	0.043	0.004
2020	0.044	0.004

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.024	0.025	0.026	0.027	0.029	0.030	0.032	0.033	0.034
2012	0.030	0.034	0.036	0.039	0.042	0.044	0.046	0.047	0.048
2013	0.025	0.027	0.029	0.032	0.035	0.038	0.040	0.042	0.044
2014	0.026	0.029	0.031	0.033	0.036	0.039	0.041	0.043	0.045
2015	0.029	0.032	0.034	0.037	0.040	0.043	0.046	0.047	0.050
2016	0.030	0.034	0.035	0.039	0.042	0.045	0.048	0.049	0.052
2017	0.031	0.034	0.036	0.039	0.042	0.045	0.048	0.049	0.052
2018	0.031	0.035	0.037	0.040	0.043	0.046	0.048	0.049	0.052
2019	0.032	0.035	0.037	0.040	0.043	0.046	0.048	0.050	0.052
2020	0.033	0.036	0.038	0.041	0.044	0.047	0.049	0.050	0.053

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.290

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2011	12.421	1.033
2012	14.544	1.574
2013	18.285	3.020
2014	23.987	5.025
2015	29.582	6.540
2016	35.781	8.116
2017	42.885	9.970
2018	51.039	12.067
2019	59.065	13.907
2020	66.960	15.529

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	10.263	10.886	11.179	11.692	12.308	13.091	13.854	14.195	15.077
2012	11.665	12.348	12.731	13.432	14.353	15.455	16.586	17.379	19.120
2013	13.301	14.339	14.978	16.180	17.805	19.843	22.178	23.827	27.834
2014	15.710	17.385	18.434	20.456	23.185	26.613	30.511	33.245	39.650
2015	18.370	20.696	22.173	24.943	28.628	33.181	38.168	41.628	49.308
2016	21.531	24.556	26.447	29.999	34.690	40.382	46.488	50.666	59.621
2017	25.230	29.028	31.367	35.792	41.583	48.630	56.041	61.015	72.138
2018	29.483	34.224	37.055	42.438	49.491	58.037	66.986	72.933	86.191
2019	33.963	39.557	42.864	49.166	57.323	67.176	77.381	84.377	98.976

2020	38.639	44.946	48.774	55.894	65.153	76.000	87.425	95.212	111.394

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 43.661 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.004
2015	0.033
2016	0.156
2017	0.415
2018	0.708
2019	0.885
2020	0.962

Pr(B >= Threshold Value) AT LEAST ONCE:= 0.962

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2011	31803.464	17195.307
2012	33321.714	17904.848
2013	34715.466	18789.917
2014	40652.275	22077.012
2015	47901.765	26365.461
2016	54064.201	29904.603
2017	59067.297	32339.783
2018	64060.452	34788.539
2019	68277.430	37284.054
2020	71442.571	38696.886

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	8599.603	12211.529	14629.500	19921.191	27990.002	39300.502	53399.830	64372.304	91327.974
2012	9053.161	12851.198	15370.166	20828.060	29324.359	41313.177	56106.684	67244.892	94283.625
2013	9378.349	13281.869	15955.826	21677.228	30521.042	42978.391	58334.661	70350.464	99399.908
2014	10825.889	15394.428	18555.100	25288.435	35700.042	50500.396	68689.469	82290.951	116667.405
2015	12645.637	18044.632	21776.724	29624.437	42041.580	59391.074	81025.179	97547.125	139426.510
2016	14280.688	20304.320	24436.600	33478.148	47364.405	66898.638	91333.267	110367.734	157930.183
2017	15673.131	22279.463	26886.283	36689.515	51793.775	73182.733	100014.899	120145.481	170490.084
2018	17139.485	24201.665	29144.279	39876.271	56204.810	79547.142	108372.402	130003.808	181341.585
2019	18170.642	25897.361	31264.009	42629.839	59900.649	84392.130	114861.741	139074.709	196651.878
2020	19203.697	27241.747	32744.843	44657.537	62780.417	88478.042	120069.311	144103.700	203522.549

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2011	0.363	0.000
2012	0.632	0.053
2013	0.707	0.075
2014	0.948	0.198

2015	1.283	0.318
2016	1.611	0.402
2017	1.952	0.486
2018	2.303	0.578
2019	2.679	0.679
2020	3.063	0.774

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.363	0.363	0.363	0.363	0.363	0.363	0.363	0.363	0.363
2012	0.527	0.554	0.569	0.595	0.626	0.667	0.703	0.726	0.766
2013	0.569	0.601	0.619	0.653	0.697	0.751	0.805	0.841	0.923
2014	0.642	0.701	0.738	0.811	0.912	1.043	1.199	1.315	1.607
2015	0.768	0.871	0.934	1.059	1.231	1.448	1.695	1.872	2.278
2016	0.924	1.068	1.158	1.326	1.553	1.832	2.141	2.351	2.831
2017	1.105	1.286	1.395	1.605	1.885	2.226	2.594	2.841	3.384
2018	1.291	1.506	1.638	1.891	2.225	2.632	3.062	3.358	4.015
2019	1.484	1.741	1.898	2.196	2.587	3.065	3.571	3.923	4.690
2020	1.693	1.993	2.170	2.512	2.961	3.504	4.085	4.481	5.341

REALIZED F SERIES

YEAR	AVG F	STD
2011	0.042	0.004
2012	0.070	0.000
2013	0.070	0.000
2014	0.070	0.000
2015	0.070	0.000
2016	0.070	0.000
2017	0.070	0.000
2018	0.070	0.000
2019	0.070	0.000
2020	0.070	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.034	0.036	0.038	0.040	0.042	0.045	0.047	0.048	0.051
2012	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2013	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2014	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2015	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2016	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2017	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2018	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2019	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2020	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.290

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000

2019	0.000
2020	0.000

GB Winter Flounder

AGEPRO VERSION 3.3

PROJECTION RUN: Freb 2011 ACL projected out to 2017 (must have 75% prob of being

INPUT FILE:
C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\KGBWIN\SARC52\PDT_GBWF_75FMSY_2230IN2011.IN
OUTPUT FILE:
C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\KGBWIN\SARC52\PDT_GBWF_75FMSY_2230IN2011.OUT
NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION: 50
TOTAL NUMBER OF SIMULATIONS: 50000
NUMBER OF FEASIBLE SIMULATIONS: 50000
PROPORTION OF SIMULATIONS THAT ARE FEASIBLE: 1.00000000000000
NUMBER OF BOOTSTRAP REALIZATIONS: 1000

NUMBER OF RECRUITMENT MODELS: 1
PROBABLE RECRUITMENT MODELS: 5
RECRUITMENT MODELS BY YEAR

YEAR	RECRUITMENT MODELS
2011	5
2012	5
2013	5
2014	5
2015	5
2016	5
2017	5

RECRUITMENT MODEL PROBABILITIES BY YEAR

YEAR	MODEL PROBABILITY
2011	1.00000000000000
2012	1.00000000000000
2013	1.00000000000000
2014	1.00000000000000
2015	1.00000000000000
2016	1.00000000000000
2017	1.00000000000000

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2011	50000
2012	50000
2013	50000
2014	50000
2015	50000
2016	50000
2017	50000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2011		2.230
2012	0.315	
2013	0.315	
2014	0.315	
2015	0.315	
2016	0.315	

2017 0.315

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2011	12.299	3.095
2012	14.413	3.419
2013	13.021	2.734
2014	13.245	3.051
2015	13.733	3.488
2016	14.376	3.735
2017	14.632	3.823

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	6.833	7.963	8.696	10.132	11.864	14.019	16.184	18.122	22.049
2012	8.174	9.470	10.234	11.971	14.168	16.364	18.757	20.396	23.939
2013	7.925	8.963	9.660	11.085	12.904	14.615	16.555	17.845	20.845
2014	7.869	9.036	9.760	11.136	12.860	14.893	17.148	18.735	22.515
2015	7.876	9.118	9.862	11.292	13.197	15.559	18.238	20.101	24.588
2016	8.082	9.405	10.207	11.746	13.815	16.354	19.237	21.271	25.949
2017	8.107	9.511	10.338	11.919	14.054	16.704	19.623	21.724	26.292

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 11.866 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.499
2012	0.767
2013	0.636
2014	0.647
2015	0.677
2016	0.736
2017	0.756

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 0.937

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2011	17.979	3.896
2012	18.687	3.929
2013	18.938	4.031
2014	19.548	4.456
2015	20.033	4.729
2016	20.638	4.909
2017	20.964	5.008

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	10.837	12.361	13.192	15.187	17.700	20.193	22.936	24.724	28.778
2012	11.249	12.876	13.958	15.926	18.376	20.997	23.765	25.708	29.796
2013	11.489	13.159	14.216	16.120	18.507	21.228	24.150	26.109	30.682
2014	11.607	13.396	14.424	16.432	18.977	22.017	25.333	27.588	33.047
2015	11.748	13.568	14.620	16.703	19.385	22.658	26.208	28.667	34.131
2016	12.004	13.889	15.011	17.186	19.966	23.360	27.058	29.641	35.152
2017	12.062	14.039	15.205	17.421	20.319	23.775	27.551	30.140	35.715

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 1000.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 0.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	AVG F_WT_B	STD
2011	0.130	0.028
2012	0.204	0.019
2013	0.202	0.025
2014	0.190	0.022
2015	0.193	0.023
2016	0.196	0.024
2017	0.197	0.024

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.076	0.090	0.097	0.110	0.126	0.147	0.169	0.180	0.202
2012	0.148	0.169	0.179	0.193	0.206	0.218	0.226	0.231	0.241
2013	0.140	0.159	0.169	0.186	0.204	0.220	0.233	0.240	0.252
2014	0.135	0.152	0.161	0.176	0.191	0.206	0.218	0.225	0.238
2015	0.136	0.153	0.162	0.177	0.193	0.208	0.222	0.230	0.244
2016	0.137	0.156	0.165	0.180	0.196	0.212	0.226	0.234	0.248
2017	0.138	0.156	0.166	0.181	0.197	0.213	0.227	0.235	0.249

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.500

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2011	18.111	3.741
2012	20.732	4.512
2013	20.616	4.228
2014	21.014	4.514
2015	21.414	4.822
2016	22.191	5.080
2017	22.497	5.183

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	11.337	12.755	13.553	15.422	17.844	20.192	22.791	24.761	28.742

2012	12.270	14.094	15.339	17.565	20.345	23.365	26.567	28.811	33.570
2013	12.608	14.430	15.546	17.661	20.212	23.108	26.107	28.210	32.632
2014	12.701	14.656	15.764	17.861	20.488	23.569	26.861	29.114	34.441
2015	12.843	14.737	15.868	18.022	20.792	24.126	27.730	30.188	35.673
2016	13.176	15.154	16.329	18.628	21.534	25.037	28.825	31.424	37.110
2017	13.191	15.280	16.502	18.831	21.853	25.432	29.323	31.963	37.650

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1000.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 0.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2011	17639.328	10328.986
2012	18197.069	10747.168
2013	17891.845	10553.501
2014	17873.392	10452.373
2015	18153.897	10760.064
2016	18206.436	10713.423
2017	18136.465	10587.538

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	4315.357	6209.584	7580.392	10553.358	15171.201	22001.560	30555.561	37156.350	53732.309
2012	4420.909	6406.680	7809.530	10835.600	15649.091	22690.148	31592.539	38400.096	55735.158
2013	4347.482	6263.447	7652.917	10661.725	15437.033	22218.858	31061.182	37781.989	55180.615
2014	4349.855	6300.084	7670.124	10678.530	15451.611	22256.058	30900.453	37791.767	54476.913
2015	4290.295	6335.690	7728.173	10807.721	15640.902	22544.881	31431.396	38422.343	56054.970
2016	4380.673	6402.085	7802.220	10867.675	15726.926	22660.576	31401.934	38550.710	55988.817
2017	4412.987	6384.415	7724.447	10823.822	15629.621	22672.492	31492.687	38412.226	54690.855

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2011	2.230	0.000
2012	3.824	0.933
2013	3.795	0.791
2014	3.675	0.760
2015	3.828	0.912
2016	4.016	0.996
2017	4.100	1.029

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	2.230	2.230	2.230	2.230	2.230	2.230	2.230	2.230	2.230
2012	2.158	2.485	2.707	3.152	3.753	4.349	4.983	5.521	6.532

2013	2.299	2.614	2.821	3.233	3.750	4.257	4.804	5.203	6.047
2014	2.255	2.580	2.777	3.144	3.598	4.111	4.655	5.034	5.870
2015	2.253	2.600	2.803	3.191	3.696	4.317	5.002	5.472	6.679
2016	2.312	2.678	2.892	3.317	3.871	4.552	5.310	5.849	7.051
2017	2.331	2.709	2.936	3.375	3.955	4.656	5.442	5.990	7.210

REALIZED F SERIES

YEAR	AVG F	STD
2011	0.196	0.050
2012	0.315	0.000
2013	0.315	0.000
2014	0.315	0.000
2015	0.315	0.000
2016	0.315	0.000
2017	0.315	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.102	0.125	0.139	0.161	0.190	0.224	0.263	0.286	0.331
2012	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315
2013	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315
2014	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315
2015	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315
2016	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315
2017	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315	0.315

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.420

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.001
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000

GB Yellowtail Flounder – No Rho Adjustment

No Rho Adjustment

AGEPRO VERSION 3.3

PROJECTION RUN: Fref=0.25

INPUT FILE: C:\DOCUMENTS AND SETTINGS\TAN\MY DOCUMENTS\PROJECTION_FILES\TRAC 2011\GB YTF\POST_SSC_EXAM\NORHO_2659_1150_0.21.IN
OUTPUT FILE: C:\DOCUMENTS AND SETTINGS\TAN\MY DOCUMENTS\PROJECTION_FILES\TRAC 2011\GB YTF\POST_SSC_EXAM\NORHO_2659_1150_0.21.OUT
NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION: 10
TOTAL NUMBER OF SIMULATIONS: 10000
NUMBER OF FEASIBLE SIMULATIONS: 10000
PROPORTION OF SIMULATIONS THAT ARE FEASIBLE: 1.00000000000000
NUMBER OF BOOTSTRAP REALIZATIONS: 1000

NUMBER OF RECRUITMENT MODELS: 1
PROBABLE RECRUITMENT MODELS: 15
RECRUITMENT MODELS BY YEAR

YEAR	RECRUITMENT MODELS
2011	15
2012	15
2013	15
2014	15
2015	15
2016	15
2017	15
2018	15
2019	15
2020	15
2021	15
2022	15
2023	15
2024	15
2025	15
2026	15
2027	15
2028	15
2029	15
2030	15
2031	15
2032	15
2033	15
2034	15
2035	15
2036	15
2037	15
2038	15
2039	15
2040	15

RECRUITMENT MODEL PROBABILITIES BY YEAR

YEAR	MODEL PROBABILITY
2011	1.00000000000000

2012	1.00000000000000
2013	1.00000000000000
2014	1.00000000000000
2015	1.00000000000000
2016	1.00000000000000
2017	1.00000000000000
2018	1.00000000000000
2019	1.00000000000000
2020	1.00000000000000
2021	1.00000000000000
2022	1.00000000000000
2023	1.00000000000000
2024	1.00000000000000
2025	1.00000000000000
2026	1.00000000000000
2027	1.00000000000000
2028	1.00000000000000
2029	1.00000000000000
2030	1.00000000000000
2031	1.00000000000000
2032	1.00000000000000
2033	1.00000000000000
2034	1.00000000000000
2035	1.00000000000000
2036	1.00000000000000
2037	1.00000000000000
2038	1.00000000000000
2039	1.00000000000000
2040	1.00000000000000

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2011	10000
2012	10000
2013	10000
2014	10000
2015	10000
2016	10000
2017	10000
2018	10000
2019	10000
2020	10000
2021	10000
2022	10000
2023	10000
2024	10000
2025	10000
2026	10000
2027	10000
2028	10000
2029	10000
2030	10000
2031	10000
2032	10000
2033	10000
2034	10000

2035	10000
2036	10000
2037	10000
2038	10000
2039	10000
2040	10000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2011		2.650
2012		1.150
2013	0.210	
2014	0.210	
2015	0.210	
2016	0.210	
2017	0.210	
2018	0.210	
2019	0.210	
2020	0.210	
2021	0.210	
2022	0.210	
2023	0.210	
2024	0.210	
2025	0.210	
2026	0.210	
2027	0.210	
2028	0.210	
2029	0.210	
2030	0.210	
2031	0.210	
2032	0.210	
2033	0.210	
2034	0.210	
2035	0.210	
2036	0.210	
2037	0.210	
2038	0.210	
2039	0.210	
2040	0.210	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2011	8.414	1.512
2012	7.872	1.642
2013	11.896	3.627
2014	18.820	7.407
2015	24.886	9.275
2016	30.391	10.494
2017	35.079	11.311
2018	38.200	11.551
2019	40.295	11.697
2020	41.591	11.756
2021	42.427	11.779
2022	43.046	11.814
2023	43.458	11.905
2024	43.729	11.952

2025	43.916	11.908
2026	44.056	11.850
2027	44.170	11.838
2028	44.194	11.829
2029	44.175	11.837
2030	44.206	11.890
2031	44.266	11.956
2032	44.352	11.949
2033	44.433	11.960
2034	44.476	11.950
2035	44.461	11.899
2036	44.401	11.925
2037	44.365	12.007
2038	44.401	12.054
2039	44.458	12.035
2040	44.436	12.016

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	5.297	6.119	6.571	7.336	8.381	9.322	10.443	11.002	12.369
2012	4.530	5.294	5.796	6.676	7.807	8.914	9.926	10.774	12.111
2013	5.987	7.173	7.905	9.255	11.079	13.963	17.438	19.132	21.449
2014	8.382	9.962	10.997	12.997	16.914	23.160	30.237	33.404	39.198
2015	10.968	12.912	14.184	17.247	23.316	31.084	37.829	42.079	50.093
2016	13.515	15.988	17.708	22.085	29.064	37.105	44.790	49.561	58.085
2017	15.849	19.084	21.106	26.409	33.935	42.401	50.524	55.574	64.645
2018	17.865	21.327	24.001	29.425	37.083	45.458	53.798	59.165	68.558
2019	19.206	23.103	25.951	31.495	39.306	47.782	56.115	61.311	71.228
2020	20.133	24.365	27.168	32.748	40.535	49.154	57.584	62.639	72.636
2021	21.146	25.194	27.863	33.610	41.329	49.965	58.280	63.578	74.422
2022	21.531	25.640	28.394	34.236	41.915	50.716	58.871	64.227	74.598
2023	22.019	25.944	28.775	34.576	42.351	51.127	59.687	64.551	75.228
2024	22.338	26.121	28.991	34.672	42.632	51.477	59.877	65.019	75.464
2025	22.477	26.379	29.123	35.003	42.855	51.609	59.904	65.020	75.416
2026	22.786	26.562	29.436	35.237	42.893	51.774	60.022	65.190	74.967
2027	22.945	26.695	29.588	35.378	43.032	51.619	60.220	65.668	76.056
2028	22.824	26.668	29.423	35.315	43.172	51.833	60.071	65.655	75.180
2029	22.536	26.702	29.587	35.396	43.190	51.775	60.139	65.363	75.660
2030	22.776	26.872	29.506	35.313	43.112	51.653	60.131	65.853	75.391
2031	22.678	26.726	29.552	35.475	43.162	52.026	60.447	65.807	75.991
2032	22.979	26.788	29.523	35.396	43.376	52.036	60.631	66.170	75.266
2033	22.886	26.794	29.536	35.433	43.314	52.102	60.804	66.018	75.269
2034	22.802	26.806	29.681	35.531	43.400	52.301	60.676	65.872	75.713
2035	22.775	26.903	29.673	35.437	43.441	52.230	60.857	65.687	75.154
2036	22.876	27.132	29.560	35.526	43.218	52.034	60.450	65.811	75.329
2037	22.631	26.711	29.542	35.397	43.161	52.008	60.655	66.155	75.981
2038	22.667	26.738	29.654	35.370	43.297	52.173	60.766	66.098	76.234
2039	22.557	26.702	29.537	35.544	43.291	52.281	60.625	65.981	75.813
2040	22.367	26.682	29.477	35.401	43.431	52.297	60.543	65.917	75.714

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 43.200 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.001

2015	0.042
2016	0.124
2017	0.231
2018	0.313
2019	0.375
2020	0.415
2021	0.438
2022	0.458
2023	0.471
2024	0.481
2025	0.491
2026	0.491
2027	0.495
2028	0.499
2029	0.500
2030	0.497
2031	0.498
2032	0.504
2033	0.504
2034	0.505
2035	0.508
2036	0.501
2037	0.499
2038	0.504
2039	0.502
2040	0.507

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 0.977

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2011

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	37.3	51.2	58.6	77.0	103.4	132.6	163.2	186.4	222.6
3	422.6	571.9	634.9	792.1	1008.9	1269.6	1559.1	1752.9	2077.3
4	665.4	855.1	989.0	1191.7	1521.8	1823.9	2268.6	2551.9	3027.2
5	1752.8	2084.5	2276.7	2646.2	3081.4	3570.7	4033.3	4414.6	4998.0
6+	1421.2	1690.1	1846.0	2145.6	2498.4	2895.2	3270.3	3579.5	4052.5

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2012

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	145.3	298.1	514.2	828.0	1216.9	1691.0	2030.4	2238.3	2409.1
3	78.2	106.7	121.9	160.9	216.4	277.6	339.7	395.1	465.3
4	341.7	443.6	516.6	653.5	839.6	1074.4	1316.5	1490.0	1786.9
5	504.8	664.7	752.9	932.3	1216.0	1480.9	1857.1	2116.2	2595.7
6+	2088.9	2539.6	2834.8	3432.3	4114.2	4918.1	5745.0	6314.9	7291.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2013

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	838.6	1151.2	1258.6	2158.6	2671.3	5849.7	9635.7	10934.3	12653.0
3	302.1	624.3	1072.4	1740.2	2555.7	3547.4	4265.7	4720.5	5084.7

4	68.9	95.1	108.5	142.7	191.1	246.7	304.0	346.8	417.7
5	289.7	373.4	443.5	567.8	729.1	940.2	1158.0	1315.0	1580.2
6+	1933.3	2416.0	2751.7	3284.2	3976.0	4652.3	5365.9	5945.5	6924.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2014

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	815.2	1148.4	1239.8	2102.1	2663.5	5767.3	9484.4	10925.6	12532.3
3	1751.2	2404.0	2628.2	4507.5	5578.2	12215.2	20121.0	22832.7	26421.6
4	263.1	543.6	933.8	1515.3	2225.3	3088.8	3714.3	4110.2	4427.4
5	58.5	80.7	92.1	121.2	162.2	209.4	258.1	294.4	354.6
6+	1652.1	2112.0	2334.0	2746.0	3334.8	3868.5	4431.1	4739.5	5470.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2015

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	846.1	1147.2	1251.2	2164.0	2668.6	5816.3	9523.9	10925.5	12602.8
3	1702.3	2398.0	2588.9	4389.5	5561.8	12043.2	19805.0	22814.6	26169.7
4	1524.8	2093.2	2288.5	3924.8	4857.1	10636.2	17519.9	19881.1	23006.1
5	223.3	461.5	792.8	1286.4	1889.2	2622.3	3153.3	3489.5	3758.7
6+	1213.7	1512.5	1675.9	1967.7	2353.6	2719.4	3103.2	3311.7	3816.6

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2016

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	809.2	1152.2	1254.9	2165.7	2671.7	5837.5	9737.1	10926.2	12818.1
3	1766.8	2395.5	2612.8	4518.9	5572.6	12145.4	19887.6	22814.3	26316.8
4	1482.3	2088.0	2254.3	3822.1	4842.8	10486.4	17244.8	19865.4	22786.7
5	1294.5	1777.1	1942.8	3332.0	4123.5	9029.8	14873.9	16878.5	19531.5
6+	1416.6	1890.5	2181.0	2683.4	3275.4	3925.0	4543.3	4867.6	5499.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2017

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	848.8	1154.6	1283.2	2175.0	2669.3	5833.3	9607.8	10925.6	12749.0
3	1689.8	2406.0	2620.5	4522.3	5579.0	12189.6	20332.8	22815.9	26766.5
4	1538.4	2085.8	2275.0	3934.7	4852.2	10575.3	17316.7	19865.1	22914.8
5	1258.4	1772.7	1913.8	3244.8	4111.4	8902.6	14640.3	16865.1	19345.2
6+	2898.8	3527.1	3979.6	4921.0	6061.1	10326.9	15367.3	17148.2	19384.9

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2018

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	838.8	1155.3	1266.4	2171.7	2674.5	5831.5	9731.6	10927.1	12840.5
3	1772.4	2411.0	2679.6	4541.8	5574.0	12180.9	20062.8	22814.5	26622.2
4	1471.3	2095.0	2281.7	3937.7	4857.8	10613.9	17704.4	19866.5	23306.4
5	1306.0	1770.8	1931.4	3340.5	4119.4	8978.2	14701.4	16864.9	19454.0
6+	4014.2	4892.5	5503.8	6779.7	9696.7	14207.5	18453.4	20675.7	25202.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2019

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	862.0	1157.7	1271.7	2165.7	2671.9	5808.5	9500.8	10925.6	12687.1
3	1751.6	2412.4	2644.6	4535.0	5584.8	12177.1	20321.2	22817.7	26813.3
4	1543.3	2099.4	2333.2	3954.6	4853.5	10606.3	17469.3	19865.2	23180.7
5	1249.1	1778.6	1937.1	3343.0	4124.1	9010.9	15030.5	16866.1	19786.4
6+	4974.7	6180.3	6837.6	8440.9	11966.7	16444.6	20744.4	23139.5	27827.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2020

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	837.4	1148.6	1248.6	2135.1	2662.1	5793.7	9491.4	10925.3	12639.4
3	1800.0	2417.5	2655.6	4522.4	5579.4	12129.1	19839.3	22814.6	26492.9
4	1525.1	2100.5	2302.7	3948.7	4862.8	10602.9	17694.3	19868.0	23347.1
5	1310.2	1782.3	1980.8	3357.4	4120.5	9004.4	14830.9	16865.0	19679.8
6+	5782.2	6986.0	7878.9	9842.9	13373.1	18044.9	22477.9	24968.5	29732.4

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2021

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	821.7	1153.8	1271.3	2163.4	2671.3	5847.5	9563.3	10925.6	12555.7
3	1748.6	2398.4	2607.2	4458.4	5559.0	12098.2	19819.7	22813.9	26393.2
4	1567.3	2105.0	2312.3	3937.8	4858.1	10561.1	17274.7	19865.3	23068.2
5	1294.8	1783.3	1954.9	3352.4	4128.4	9001.6	15022.0	16867.4	19821.0
6+	6351.2	7805.7	8738.4	10872.8	14389.1	18907.0	23176.2	25745.5	30527.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2022

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	843.3	1151.7	1258.3	2163.4	2666.8	5822.1	9719.2	10926.4	12696.2
3	1715.9	2409.4	2654.7	4517.6	5578.2	12210.7	19969.9	22814.6	26218.5
4	1522.6	2088.4	2270.2	3882.0	4840.4	10534.2	17257.6	19864.7	22981.4
5	1330.6	1787.1	1963.1	3343.1	4124.4	8966.1	14665.7	16865.1	19584.2
6+	6853.3	8335.5	9410.5	11561.9	15024.8	19477.3	23934.4	26528.6	30984.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2023

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	837.0	1151.7	1262.1	2168.2	2671.4	5855.4	9513.8	10925.9	12714.3
3	1761.0	2405.0	2627.5	4517.7	5568.7	12157.5	20295.4	22816.1	26511.9
4	1494.1	2097.9	2311.6	3933.6	4857.1	10632.2	17388.4	19865.3	22829.2
5	1292.6	1773.0	1927.3	3295.7	4109.4	8943.3	14651.2	16864.6	19510.5
6+	7122.5	8732.9	9734.1	11922.3	15383.3	19956.5	24329.3	26892.0	31419.9

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2024

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	850.2	1150.7	1262.6	2168.2	2668.8	5797.4	9764.9	10926.0	12621.5
3	1747.8	2404.9	2635.4	4527.6	5578.4	12227.0	19866.4	22815.2	26549.6
4	1533.3	2094.1	2287.9	3933.7	4848.8	10585.9	17671.8	19866.7	23084.7
5	1268.4	1781.1	1962.5	3339.5	4123.5	9026.4	14762.2	16865.1	19381.4

6+	7379.1	8925.0	9900.5	12018.9	15583.0	20059.6	24491.3	27024.9	32376.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2025

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	844.6	1152.9	1262.9	2165.5	2668.2	5811.9	9629.8	10926.3	12789.0
3	1775.3	2402.9	2636.4	4527.6	5573.0	12106.0	20390.7	22815.5	26355.8
4	1521.9	2094.0	2294.7	3942.3	4857.3	10646.4	17298.3	19865.8	23117.6
5	1301.7	1777.8	1942.3	3339.6	4116.5	8987.1	15002.8	16866.2	19598.2
6+	7594.9	9074.6	10061.0	12309.9	15751.6	20296.3	24732.4	27263.5	31963.5

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2026

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	836.5	1152.7	1265.6	2165.8	2670.3	5823.9	9731.8	10926.5	12794.1
3	1763.7	2407.5	2637.2	4521.9	5571.7	12136.3	20108.6	22816.0	26705.6
4	1545.8	2092.3	2295.6	3942.4	4852.5	10541.0	17754.8	19866.1	22948.8
5	1292.0	1777.7	1948.2	3346.9	4123.7	9038.5	14685.7	16865.5	19626.1
6+	7723.5	9167.5	10156.2	12374.6	15869.7	20528.4	24837.8	27343.2	32287.9

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2027

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	867.4	1153.7	1269.3	2167.5	2673.6	5836.0	9705.6	10925.8	12835.1
3	1746.7	2407.0	2642.9	4522.5	5576.1	12161.2	20321.7	22816.4	26716.3
4	1535.7	2096.3	2296.3	3937.4	4851.5	10567.4	17509.2	19866.5	23253.3
5	1312.3	1776.3	1948.9	3346.9	4119.7	8949.0	15073.3	16865.7	19482.9
6+	7842.3	9239.6	10189.8	12383.9	15981.2	20705.2	24958.8	27741.5	32270.5

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2028

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	844.8	1154.4	1267.1	2169.4	2666.1	5760.3	9566.8	10925.9	12719.4
3	1811.4	2409.2	2650.4	4526.2	5583.0	12186.5	20267.0	22814.9	26802.0
4	1520.9	2095.8	2301.2	3937.9	4855.3	10589.2	17694.7	19866.9	23262.7
5	1303.8	1779.7	1949.5	3342.7	4118.8	8971.4	14864.8	16866.1	19741.4
6+	7922.8	9298.5	10248.2	12478.9	16016.8	20584.9	25018.6	27663.9	32455.8

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2029

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	832.1	1154.0	1270.7	2163.0	2670.3	5828.0	9505.3	10925.9	12721.4
3	1764.0	2410.5	2646.0	4530.1	5567.3	12028.5	19977.2	22815.2	26560.4
4	1577.2	2097.7	2307.8	3941.1	4861.3	10611.2	17647.1	19865.6	23337.3
5	1291.2	1779.3	1953.7	3343.2	4122.0	8989.9	15022.3	16866.4	19749.4
6+	7829.5	9325.3	10298.6	12559.8	16102.8	20649.1	24936.2	27480.4	32244.4

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2030

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2	843.6	1149.4	1261.0	2162.7	2668.3	5818.0	9668.6	10926.1	12852.5
3	1737.6	2409.8	2653.3	4516.7	5576.1	12169.9	19848.6	22815.2	26564.6
4	1536.0	2098.9	2303.9	3944.5	4847.6	10473.6	17394.7	19865.9	23126.9
5	1339.0	1780.9	1959.3	3345.9	4127.1	9008.6	14981.9	16865.3	19812.7
6+	8012.0	9459.6	10434.1	12608.6	16038.5	20617.4	24953.2	27689.6	32637.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2031

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.0	1154.3	1267.1	2168.7	2672.7	5866.6	9635.2	10926.3	12746.8
3	1761.5	2400.0	2633.2	4516.1	5571.8	12148.9	20189.7	22815.6	26838.2
4	1513.0	2098.3	2310.3	3932.8	4855.2	10596.7	17282.8	19865.9	23130.5
5	1304.0	1781.9	1956.0	3348.8	4115.4	8891.8	14767.6	16865.6	19634.1
6+	8065.0	9459.1	10418.5	12611.0	16138.0	20701.1	25196.6	27727.5	32309.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2032

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	867.3	1158.1	1288.9	2173.2	2675.7	5856.6	9655.4	10926.1	12734.4
3	1735.3	2410.3	2646.0	4528.5	5581.1	12250.4	20119.9	22815.9	26617.5
4	1533.8	2089.8	2292.8	3932.3	4851.5	10578.4	17579.8	19866.2	23368.8
5	1284.5	1781.4	1961.4	3338.8	4122.0	8996.3	14672.6	16865.5	19637.2
6+	7920.4	9393.5	10383.3	12569.3	16115.5	20639.8	24942.9	27648.2	32477.9

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2033

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.9	1149.9	1255.5	2161.7	2673.1	5877.0	9649.0	10925.9	12725.4
3	1811.1	2418.2	2691.5	4538.1	5587.4	12229.5	20162.1	22815.6	26591.6
4	1511.0	2098.7	2303.9	3943.1	4859.7	10666.8	17519.0	19866.5	23176.6
5	1302.1	1774.2	1946.6	3338.4	4118.8	8980.8	14924.8	16865.8	19839.4
6+	7990.8	9425.0	10392.4	12562.9	16109.5	20566.5	24999.3	27766.5	32668.6

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2034

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	840.2	1154.4	1269.7	2163.6	2671.7	5858.1	9806.4	10926.0	12766.4
3	1737.1	2401.3	2621.6	4514.0	5581.8	12272.3	20148.9	22815.2	26572.9
4	1577.0	2105.6	2343.6	3951.5	4865.1	10648.6	17555.7	19866.2	23154.1
5	1282.8	1781.8	1956.0	3347.6	4125.7	9055.8	14873.1	16866.1	19676.3
6+	7931.5	9475.6	10411.6	12578.6	16065.0	20668.6	25106.2	27792.6	32446.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2035

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	841.2	1145.9	1245.8	2160.5	2665.7	5828.6	9567.9	10925.7	12675.9
3	1754.5	2410.6	2651.4	4517.9	5578.9	12232.8	20477.4	22815.4	26658.5
4	1512.5	2090.8	2282.7	3930.5	4860.2	10685.8	17544.2	19865.8	23137.8
5	1338.8	1787.6	1989.6	3354.7	4130.4	9040.4	14904.3	16865.9	19657.2
6+	7958.2	9382.6	10357.5	12554.6	16246.1	20810.0	25164.2	27924.7	32446.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2036

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.4	1154.4	1268.1	2165.8	2670.3	5792.7	9645.7	10925.6	12788.2
3	1756.5	2392.8	2601.5	4511.5	5566.5	12171.2	19979.5	22814.8	26469.5
4	1527.7	2099.0	2308.6	3933.9	4857.7	10651.4	17830.3	19866.0	23212.4
5	1284.1	1775.1	1937.9	3336.9	4126.2	9071.9	14894.5	16865.5	19643.3
6+	7936.6	9454.3	10396.0	12663.8	16304.9	20814.5	25170.2	27869.8	32490.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2037

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	821.1	1152.6	1261.2	2161.1	2672.0	5856.5	9613.4	10925.1	12671.1
3	1736.0	2410.7	2648.0	4522.6	5576.1	12096.2	20141.8	22814.5	26704.0
4	1529.4	2083.5	2265.2	3928.3	4846.9	10597.8	17396.7	19865.5	23047.8
5	1297.0	1782.0	1960.0	3339.8	4124.0	9042.8	15137.4	16865.7	19706.6
6+	7929.9	9437.3	10438.3	12647.1	16244.6	20808.9	25301.3	27787.1	32723.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2038

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	850.8	1155.3	1265.6	2169.6	2671.7	5898.7	9672.2	10925.6	12714.9
3	1714.6	2406.8	2633.7	4512.7	5579.7	12229.3	20074.3	22813.6	26459.4
4	1511.6	2099.0	2305.7	3938.0	4855.3	10532.5	17538.1	19865.2	23251.9
5	1298.5	1768.8	1923.1	3335.0	4114.9	8997.2	14769.3	16865.3	19566.9
6+	8016.3	9465.1	10410.0	12666.2	16277.3	20773.1	25211.8	27823.0	32725.4

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2039

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	830.6	1151.3	1268.5	2167.0	2671.1	5841.8	9647.9	10926.0	12681.8
3	1776.5	2412.4	2642.9	4530.4	5579.0	12317.5	20197.2	22814.6	26550.9
4	1493.0	2095.6	2293.2	3929.3	4858.4	10648.4	17479.3	19864.4	23039.0
5	1283.3	1782.0	1957.5	3343.2	4122.0	8941.8	14889.3	16865.0	19740.2
6+	7978.7	9458.8	10418.1	12654.5	16158.0	20856.5	25098.0	27600.3	32865.8

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2040

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	811.3	1147.0	1256.7	2157.9	2666.4	5821.7	9645.1	10926.1	12676.9
3	1734.4	2404.0	2648.9	4525.1	5577.8	12198.8	20146.6	22815.3	26481.8
4	1546.9	2100.5	2301.2	3944.8	4857.8	10725.2	17586.3	19865.3	23118.6
5	1267.5	1779.1	1946.9	3335.9	4124.6	9040.2	14839.5	16864.4	19559.4
6+	7993.7	9481.6	10422.7	12580.1	16143.4	20738.6	25170.2	27881.7	32564.1

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2011	9.630	1.659
2012	13.565	3.839
2013	20.874	7.657
2014	27.788	10.019

2015	33.802	11.461
2016	39.197	12.389
2017	43.769	12.949
2018	46.793	13.200
2019	48.727	13.347
2020	49.995	13.386
2021	50.878	13.432
2022	51.492	13.520
2023	51.884	13.577
2024	52.135	13.552
2025	52.336	13.473
2026	52.491	13.456
2027	52.546	13.461
2028	52.544	13.459
2029	52.574	13.501
2030	52.648	13.577
2031	52.748	13.594
2032	52.826	13.611
2033	52.883	13.597
2034	52.874	13.542
2035	52.826	13.551
2036	52.790	13.641
2037	52.826	13.704
2038	52.883	13.702
2039	52.860	13.670
2040	52.740	13.619

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	6.259	7.023	7.522	8.413	9.572	10.683	11.729	12.578	13.981
2012	7.174	8.504	9.288	10.751	12.753	15.756	19.372	21.194	23.511
2013	9.708	11.491	12.692	14.893	19.026	25.417	32.499	35.913	41.794
2014	12.593	14.818	16.212	19.590	26.088	34.484	41.680	46.314	55.006
2015	15.342	17.987	19.909	24.728	32.354	41.200	49.567	54.796	64.358
2016	18.132	21.600	23.879	29.659	37.969	47.242	55.965	61.627	71.453
2017	20.759	24.806	27.898	34.016	42.618	51.939	61.172	67.274	77.620
2018	22.640	27.146	30.502	36.982	45.831	55.269	64.346	70.445	82.020
2019	23.947	29.027	32.338	38.796	47.506	57.303	66.627	72.568	84.478
2020	25.224	30.090	33.443	40.121	48.787	58.476	67.747	74.013	86.289
2021	25.950	30.929	34.106	40.968	49.724	59.763	68.746	74.613	86.193
2022	26.497	31.450	34.778	41.519	50.236	60.147	69.830	75.229	87.047
2023	27.097	31.671	35.012	41.767	50.747	60.611	70.240	75.855	87.921
2024	27.153	31.919	35.275	42.042	50.967	60.979	70.302	75.966	87.582
2025	27.617	32.243	35.622	42.349	51.182	61.081	70.364	76.214	87.403
2026	27.802	32.400	35.766	42.615	51.341	61.018	70.604	76.476	88.623
2027	27.762	32.256	35.667	42.745	51.456	61.267	70.675	76.736	87.602
2028	27.307	32.346	35.862	42.607	51.537	61.143	70.656	76.535	88.109
2029	27.623	32.612	35.771	42.562	51.508	61.185	70.572	76.929	87.789
2030	27.529	32.340	35.951	42.719	51.399	61.376	71.130	76.696	88.572
2031	27.873	32.460	35.788	42.704	51.642	61.504	71.022	77.469	88.429
2032	27.639	32.533	35.756	42.682	51.705	61.567	71.351	77.232	87.687
2033	27.681	32.528	35.970	42.759	51.747	61.701	71.352	76.661	87.491
2034	27.734	32.565	35.964	42.727	51.724	61.808	71.303	76.804	87.641
2035	27.804	32.717	35.985	42.813	51.541	61.489	71.235	76.878	87.541
2036	27.526	32.450	35.853	42.819	51.578	61.468	71.131	77.342	88.528
2037	27.677	32.529	35.904	42.624	51.751	61.649	71.435	77.296	88.825

2038	27.439	32.503	35.838	42.773	51.644	61.863	71.232	77.230	88.623
2039	27.223	32.453	35.794	42.740	51.777	61.769	71.137	76.997	88.062
2040	27.527	32.563	35.820	42.768	51.508	61.569	71.313	77.207	87.681

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2011	0.284	0.050
2012	0.091	0.025
2013	0.096	0.022
2014	0.114	0.023
2015	0.130	0.025
2016	0.140	0.023
2017	0.147	0.022
2018	0.152	0.021
2019	0.154	0.020
2020	0.156	0.020
2021	0.157	0.019
2022	0.157	0.019
2023	0.158	0.019
2024	0.158	0.019

2025	0.158	0.019
2026	0.158	0.019
2027	0.159	0.019
2028	0.159	0.019
2029	0.159	0.019
2030	0.158	0.019
2031	0.158	0.019
2032	0.158	0.019
2033	0.158	0.019
2034	0.159	0.019
2035	0.159	0.019
2036	0.159	0.019
2037	0.159	0.019
2038	0.158	0.019
2039	0.159	0.019
2040	0.159	0.019

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.189	0.210	0.226	0.248	0.277	0.315	0.352	0.377	0.419
2012	0.049	0.054	0.059	0.073	0.090	0.107	0.124	0.135	0.160
2013	0.057	0.064	0.069	0.078	0.095	0.113	0.126	0.133	0.145
2014	0.067	0.076	0.082	0.096	0.116	0.133	0.146	0.151	0.158
2015	0.076	0.088	0.095	0.112	0.132	0.149	0.161	0.167	0.176
2016	0.087	0.099	0.107	0.124	0.142	0.158	0.169	0.174	0.181
2017	0.093	0.108	0.116	0.132	0.150	0.164	0.174	0.179	0.185
2018	0.099	0.114	0.122	0.137	0.154	0.168	0.177	0.181	0.187
2019	0.104	0.118	0.126	0.141	0.157	0.170	0.178	0.182	0.188
2020	0.106	0.120	0.128	0.142	0.159	0.172	0.180	0.183	0.189
2021	0.107	0.121	0.130	0.143	0.159	0.172	0.180	0.184	0.189
2022	0.108	0.122	0.130	0.144	0.160	0.173	0.180	0.184	0.190
2023	0.110	0.123	0.131	0.144	0.160	0.173	0.180	0.184	0.190
2024	0.110	0.124	0.131	0.145	0.161	0.173	0.181	0.184	0.190
2025	0.110	0.123	0.131	0.145	0.161	0.173	0.181	0.185	0.190
2026	0.110	0.123	0.131	0.145	0.161	0.173	0.181	0.185	0.190
2027	0.110	0.124	0.132	0.146	0.161	0.173	0.181	0.185	0.191
2028	0.112	0.125	0.132	0.146	0.162	0.174	0.181	0.185	0.190
2029	0.110	0.124	0.132	0.146	0.161	0.173	0.181	0.185	0.190
2030	0.111	0.124	0.132	0.145	0.161	0.173	0.181	0.184	0.190
2031	0.110	0.124	0.131	0.145	0.161	0.173	0.181	0.184	0.190
2032	0.111	0.124	0.132	0.145	0.161	0.173	0.181	0.184	0.190
2033	0.110	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2034	0.111	0.124	0.131	0.145	0.161	0.174	0.182	0.185	0.190
2035	0.111	0.124	0.132	0.146	0.162	0.174	0.181	0.185	0.191
2036	0.110	0.125	0.133	0.146	0.161	0.174	0.181	0.184	0.190
2037	0.112	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2038	0.110	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2039	0.109	0.123	0.131	0.146	0.162	0.174	0.181	0.185	0.190
2040	0.112	0.124	0.132	0.146	0.162	0.174	0.181	0.185	0.191

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000

2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2011	9.537	1.501
2012	7.371	1.559
2013	8.536	1.981
2014	15.648	6.903
2015	21.866	9.058
2016	27.748	10.394
2017	33.323	11.638
2018	36.973	11.983
2019	39.498	12.155
2020	41.111	12.211
2021	42.044	12.279
2022	42.783	12.258
2023	43.254	12.356
2024	43.584	12.430
2025	43.800	12.439
2026	43.954	12.371
2027	44.079	12.338
2028	44.175	12.324
2029	44.118	12.300
2030	44.151	12.356
2031	44.180	12.418
2032	44.262	12.463
2033	44.356	12.406
2034	44.418	12.480
2035	44.447	12.405
2036	44.383	12.376

2037	44.332	12.452
2038	44.314	12.533
2039	44.402	12.541
2040	44.419	12.512

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	6.404	7.245	7.698	8.460	9.483	10.456	11.546	12.107	13.532
2012	4.235	4.976	5.460	6.259	7.344	8.319	9.501	10.059	11.452
2013	4.434	5.570	6.010	7.090	8.450	9.828	11.079	11.848	13.669
2014	6.856	8.251	9.109	10.656	12.949	19.443	27.366	30.220	33.822
2015	9.130	10.863	12.045	14.392	19.856	28.345	34.354	38.617	47.387
2016	11.929	14.119	15.596	19.022	26.388	34.453	42.122	46.858	55.976
2017	14.426	17.155	18.953	24.235	32.178	40.696	49.278	54.403	64.516
2018	16.380	19.893	22.109	27.777	35.788	44.726	53.287	58.776	68.088
2019	18.173	21.720	24.542	30.387	38.409	47.185	55.939	61.399	71.769
2020	19.184	23.272	25.994	31.947	39.980	48.991	57.709	62.922	73.656
2021	19.905	24.092	27.028	32.723	40.860	49.949	58.685	64.116	74.968
2022	20.797	24.867	27.589	33.632	41.636	50.620	59.509	64.784	75.442
2023	21.098	25.168	27.996	33.977	42.023	51.271	60.100	65.023	76.328
2024	21.723	25.517	28.224	34.241	42.413	51.600	60.391	66.059	76.328
2025	21.790	25.607	28.420	34.491	42.613	51.842	60.466	65.951	76.861
2026	21.877	25.845	28.465	34.506	42.858	52.103	60.721	66.064	76.200
2027	22.212	26.067	28.860	34.713	42.855	51.923	60.625	66.406	77.306
2028	22.554	26.103	28.826	34.967	43.124	52.158	60.856	66.939	76.462
2029	22.160	25.950	28.855	34.837	42.992	52.023	60.858	65.866	76.664
2030	22.070	26.075	28.820	34.929	43.102	51.946	60.741	66.215	76.835
2031	22.006	26.179	28.931	34.800	43.006	52.071	61.201	66.284	77.610
2032	22.276	26.123	28.734	34.881	43.159	52.260	61.261	66.679	76.943
2033	22.318	26.240	28.915	35.006	43.178	52.357	61.467	66.883	76.975
2034	22.168	26.155	28.925	35.030	43.199	52.519	61.381	66.870	77.166
2035	22.174	26.138	29.040	35.135	43.392	52.373	61.353	66.820	76.227
2036	22.244	26.215	29.135	35.009	43.246	52.513	60.888	66.332	77.085
2037	22.302	26.340	28.819	34.906	43.149	52.374	61.218	66.816	77.571
2038	22.336	26.071	28.856	35.034	43.031	52.289	61.282	66.984	77.557
2039	22.099	26.033	28.809	34.971	43.285	52.407	61.523	66.655	77.315
2040	21.997	25.905	28.768	35.087	43.377	52.526	61.410	66.800	77.553

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000

2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2011	39019.196	28990.321
2012	38246.491	28675.301
2013	38759.310	28848.352
2014	39226.159	29193.678
2015	39015.768	28956.038
2016	39301.197	29217.726
2017	38881.723	28700.215
2018	38390.513	28833.363
2019	39023.987	28868.223
2020	38978.034	29166.332
2021	39079.530	28950.768
2022	38892.919	29052.793
2023	38976.775	29103.324
2024	39065.380	29196.806
2025	39130.751	29053.828
2026	38557.098	28753.987
2027	38964.266	28878.825
2028	38978.895	29073.805
2029	39321.988	29091.314
2030	39309.032	28993.072
2031	39251.663	29039.566
2032	39128.327	29187.736
2033	38810.575	28982.166
2034	38880.716	29002.097
2035	39018.159	28955.870
2036	39485.752	29197.761
2037	39155.565	29205.289
2038	38792.920	29000.091
2039	38351.608	28617.199
2040	38943.367	29047.720

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	7737.782	10616.754	11610.663	19914.645	24644.237	53969.907	88920.867	100858.131	116694.316

2012	7525.727	10601.347	11445.283	19405.387	24587.739	53241.054	87554.724	100859.943	115692.041
2013	7810.610	10589.959	11550.627	19977.397	24635.431	53692.859	87920.127	100858.472	116342.586
2014	7470.300	10636.491	11584.687	19992.429	24664.004	53888.411	89888.346	100865.516	118330.558
2015	7835.477	10658.787	11846.165	20078.390	24641.989	53849.837	88694.692	100859.287	117692.723
2016	7743.371	10664.847	11691.170	20048.409	24689.513	53833.000	89837.132	100873.409	118537.307
2017	7957.312	10687.419	11739.940	19992.828	24665.477	53620.724	87706.673	100859.769	117121.234
2018	7730.351	10602.980	11526.222	19709.717	24575.511	53484.180	87619.971	100856.586	116680.471
2019	7585.606	10651.496	11736.221	19971.686	24660.361	53981.524	88283.914	100859.767	115908.073
2020	7784.913	10632.183	11615.899	19971.868	24618.166	53746.525	89722.794	100866.626	117205.043
2021	7726.855	10631.546	11650.748	20015.758	24661.369	54053.878	87826.321	100862.294	117371.910
2022	7848.219	10623.001	11655.313	20016.022	24637.206	53518.630	90144.291	100863.626	116515.081
2023	7797.186	10643.410	11658.583	19990.680	24631.768	53652.601	88897.123	100865.940	118061.246
2024	7721.813	10640.775	11683.654	19993.450	24651.143	53763.015	89838.971	100867.738	118108.861
2025	8007.722	10650.535	11717.105	20009.590	24681.498	53874.840	89597.480	100861.081	118487.365
2026	7798.345	10656.433	11697.525	20026.929	24611.974	53176.120	88315.980	100862.687	117419.251
2027	7681.721	10653.408	11730.002	19967.580	24650.941	53801.255	87747.682	100862.454	117437.877
2028	7787.312	10610.241	11641.148	19964.960	24631.953	53708.613	89255.790	100864.141	118647.542
2029	7671.512	10655.648	11697.446	20020.000	24673.326	54157.290	88947.156	100865.721	117671.898
2030	8006.702	10690.566	11898.784	20062.266	24701.122	54064.838	89133.494	100864.417	117557.447
2031	7679.255	10615.576	11589.680	19955.678	24676.313	54253.752	89075.131	100862.305	117474.770
2032	7756.529	10656.837	11721.335	19973.026	24663.406	54079.211	90527.635	100863.177	117853.309
2033	7765.272	10578.270	11501.033	19944.786	24608.613	53806.969	88326.323	100860.824	117017.658
2034	7674.628	10657.179	11706.410	19993.828	24651.208	53475.269	89043.874	100859.220	118054.078
2035	7580.087	10639.958	11643.143	19949.828	24666.804	54063.926	88745.629	100855.311	116973.012
2036	7853.706	10664.834	11683.805	20028.233	24663.727	54453.762	89288.610	100859.727	117377.341
2037	7667.497	10627.762	11710.166	20004.848	24658.478	53928.976	89064.953	100863.154	117072.053
2038	7489.963	10588.492	11601.498	19920.801	24614.489	53743.277	89038.263	100864.479	117026.631
2039	7545.411	10647.550	11618.015	19987.165	24635.134	53042.021	87063.259	100860.719	117018.790
2040	7833.248	10644.706	11664.636	19960.444	24645.630	53725.230	89465.911	100863.742	117251.613

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2011	2.650	0.000
2012	1.150	0.000
2013	1.889	0.449
2014	3.126	1.213
2015	4.365	1.666
2016	5.481	1.936
2017	6.438	2.129
2018	7.074	2.188
2019	7.505	2.214
2020	7.779	2.225
2021	7.946	2.233
2022	8.068	2.236
2023	8.151	2.251
2024	8.209	2.265
2025	8.247	2.262
2026	8.274	2.250
2027	8.296	2.244
2028	8.307	2.243
2029	8.302	2.242
2030	8.306	2.252
2031	8.314	2.263
2032	8.329	2.267
2033	8.346	2.264
2034	8.357	2.267

2035	8.359	2.259
2036	8.348	2.259
2037	8.339	2.272
2038	8.339	2.283
2039	8.352	2.282
2040	8.353	2.279

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	2.650	2.650	2.650	2.650	2.650	2.650	2.650	2.650	2.650
2012	1.150	1.150	1.150	1.150	1.150	1.150	1.150	1.150	1.150
2013	1.007	1.225	1.340	1.566	1.852	2.174	2.498	2.701	3.029
2014	1.447	1.723	1.897	2.225	2.751	3.784	5.090	5.627	6.381
2015	1.925	2.285	2.517	3.002	4.011	5.539	6.666	7.436	8.991
2016	2.448	2.897	3.196	3.891	5.217	6.721	8.166	9.052	10.707
2017	2.914	3.457	3.824	4.772	6.223	7.801	9.379	10.282	12.078
2018	3.268	3.923	4.368	5.404	6.859	8.449	10.052	11.085	12.772
2019	3.577	4.287	4.781	5.825	7.325	8.897	10.505	11.491	13.394
2020	3.737	4.551	5.040	6.104	7.590	9.206	10.786	11.754	13.760
2021	3.919	4.680	5.204	6.274	7.741	9.383	10.950	11.925	14.013
2022	4.044	4.802	5.294	6.398	7.847	9.541	11.106	12.046	14.002
2023	4.130	4.845	5.388	6.454	7.918	9.595	11.201	12.110	14.146
2024	4.187	4.907	5.412	6.494	8.012	9.662	11.286	12.238	14.201
2025	4.220	4.932	5.446	6.549	8.036	9.709	11.294	12.299	14.274
2026	4.266	4.969	5.474	6.583	8.068	9.755	11.301	12.321	14.106
2027	4.314	5.004	5.525	6.611	8.082	9.730	11.332	12.316	14.287
2028	4.303	5.000	5.511	6.625	8.106	9.745	11.323	12.397	14.202
2029	4.281	4.988	5.520	6.630	8.112	9.750	11.369	12.284	14.239
2030	4.268	5.020	5.516	6.625	8.106	9.729	11.326	12.378	14.207
2031	4.264	5.011	5.544	6.611	8.112	9.761	11.391	12.358	14.390
2032	4.316	5.012	5.502	6.610	8.129	9.790	11.394	12.465	14.292
2033	4.308	5.026	5.528	6.635	8.150	9.807	11.461	12.456	14.201
2034	4.272	5.025	5.554	6.655	8.155	9.845	11.431	12.415	14.271
2035	4.310	5.031	5.557	6.647	8.162	9.827	11.435	12.354	14.151
2036	4.309	5.047	5.532	6.644	8.130	9.818	11.389	12.389	14.291
2037	4.252	5.030	5.531	6.637	8.121	9.790	11.418	12.425	14.360
2038	4.279	5.030	5.520	6.628	8.128	9.799	11.424	12.442	14.382
2039	4.253	5.001	5.524	6.638	8.141	9.830	11.443	12.396	14.282
2040	4.224	5.004	5.511	6.638	8.148	9.833	11.427	12.462	14.302

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2011

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	1350.5	2751.8	4717.0	7602.4	11223.8	15584.8	18678.1	20570.4	22150.8
2	283.6	392.5	447.1	586.6	786.2	1008.8	1245.7	1421.2	1681.0
3	1229.1	1694.1	1909.6	2366.6	2988.8	3745.8	4565.2	5118.1	6099.9
4	1608.7	2075.2	2393.6	2883.2	3569.6	4292.6	5277.4	5897.4	6969.9
5	3481.3	4044.6	4368.2	4977.2	5686.8	6490.4	7269.9	7852.0	8760.5
6+	2126.4	2470.5	2668.2	3040.2	3473.6	3964.4	4440.6	4796.2	5351.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2012

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7737.8	10616.8	11610.7	19914.6	24644.2	53969.9	88920.9	100858.1	116694.3
2	1097.8	2240.2	3846.3	6197.0	9121.5	12696.1	15211.6	16754.9	18045.3
3	217.3	298.6	340.0	447.7	602.3	771.3	946.2	1088.7	1303.0

4	765.3	1011.6	1139.1	1437.6	1847.3	2344.7	2892.3	3242.0	3884.7
5	879.4	1150.5	1312.9	1612.8	2096.0	2526.9	3169.6	3567.9	4376.6
6+	2786.2	3388.3	3753.6	4474.5	5335.0	6310.9	7312.8	8032.1	9231.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2013

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7525.7	10601.3	11445.3	19405.4	24587.7	53241.1	87554.7	100859.9	115692.0
2	6317.1	8672.1	9480.9	16259.9	20122.4	44064.6	72583.3	82365.3	95311.9
3	854.6	1765.9	3033.3	4922.1	7228.4	10033.5	12065.2	13351.3	14381.6
4	154.3	212.9	242.9	319.5	427.7	552.2	680.5	776.3	935.0
5	506.8	653.3	775.9	993.5	1275.7	1645.1	2026.2	2300.9	2764.9
6+	2548.3	3184.5	3627.0	4329.0	5240.9	6132.3	7073.0	7836.8	9126.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2014

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7810.6	10590.0	11550.6	19977.4	24635.4	53692.9	87920.1	100858.5	116342.6
2	6140.9	8650.5	9339.2	15834.5	20063.2	43443.9	71443.3	82300.1	94402.9
3	4953.1	6799.5	7433.7	12748.9	15777.3	34549.6	56910.2	64580.0	74731.0
4	588.9	1216.8	2090.1	3391.7	4980.9	6913.8	8313.8	9200.0	9909.9
5	102.4	141.3	161.2	212.0	283.9	366.5	451.6	515.2	620.5
6+	2177.6	2783.8	3076.5	3619.6	4395.6	5099.2	5840.8	6247.2	7210.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2015

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7470.3	10636.5	11584.7	19992.4	24664.0	53888.4	89888.3	100865.5	118330.6
2	6373.3	8641.2	9425.1	16301.2	20102.1	43812.5	71741.5	82298.9	94933.7
3	4814.9	6782.6	7322.5	12415.3	15730.9	34062.9	56016.4	64528.9	74018.3
4	3413.0	4685.3	5122.3	8784.9	10871.7	23807.1	39215.2	44500.2	51495.0
5	390.8	807.5	1387.1	2250.9	3305.6	4588.3	5517.4	6105.6	6576.7
6+	1599.8	1993.6	2209.0	2593.7	3102.3	3584.5	4090.4	4365.2	5030.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2016

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7835.5	10658.8	11846.2	20078.4	24642.0	53849.8	88694.7	100859.3	117692.7
2	6095.6	8679.2	9452.9	16313.5	20125.4	43972.1	73347.5	82304.7	96555.9
3	4997.1	6775.3	7389.9	12781.3	15761.4	34352.0	56250.2	64527.9	74434.5
4	3317.8	4673.7	5045.8	8555.0	10839.7	23471.8	38599.3	44465.0	51003.9
5	2265.0	3109.4	3399.4	5830.1	7215.0	15799.6	26025.2	29532.6	34174.7
6+	1867.3	2491.9	2874.8	3537.1	4317.3	5173.6	5988.6	6416.1	7248.3

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2017

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7743.4	10664.8	11691.2	20048.4	24689.5	53833.0	89837.1	100873.4	118537.3
2	6393.6	8697.4	9666.3	16383.7	20107.5	43940.6	72373.5	82299.6	96035.4
3	4779.4	6805.1	7411.7	12790.9	15779.7	34477.1	57509.4	64532.4	75706.4
4	3443.4	4668.7	5092.2	8807.2	10860.8	23671.0	38760.4	44464.4	51290.7
5	2201.8	3101.7	3348.6	5677.6	7193.8	15577.1	25616.4	29509.2	33848.7
6+	3820.9	4649.2	5245.6	6486.5	7989.3	13612.2	20256.0	22603.5	25551.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2018

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7957.3	10687.4	11739.9	19992.8	24665.5	53620.7	87706.7	100859.8	117121.2
2	6318.5	8702.3	9539.8	16359.2	20146.3	43926.9	73305.7	82311.1	96724.6
3	5013.0	6819.4	7579.0	12845.9	15765.6	34452.4	56745.7	64528.5	75298.3
4	3293.3	4689.2	5107.2	8813.8	10873.4	23757.2	39628.1	44467.5	52167.1
5	2285.2	3098.4	3379.4	5844.9	7207.7	15709.3	25723.3	29508.8	34039.1
6+	5291.2	6448.9	7254.7	8936.4	12781.4	18727.3	24323.8	27253.1	33219.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2019

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7730.4	10603.0	11526.2	19709.7	24575.5	53484.2	87620.0	100856.6	116680.5
2	6493.0	8720.8	9579.6	16313.8	20126.6	43753.7	71567.3	82300.0	95569.1
3	4954.1	6823.2	7479.9	12826.7	15796.0	34441.7	57476.6	64537.5	75838.6
4	3454.3	4699.0	5222.5	8851.7	10863.6	23740.2	39101.9	44464.7	51885.9
5	2185.6	3112.0	3389.4	5849.3	7216.1	15766.5	26299.2	29510.9	34620.7
6+	6557.2	8146.4	9012.8	11126.2	15773.6	21676.0	27343.7	30500.7	36679.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2020

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7585.6	10651.5	11736.2	19971.7	24660.4	53981.5	88283.9	100859.8	115908.1
2	6307.8	8651.9	9405.2	16082.8	20053.2	43642.3	71496.5	82297.4	95209.4
3	5091.0	6837.7	7511.1	12791.2	15780.7	34305.8	56113.6	64528.8	74932.6
4	3413.7	4701.7	5154.2	8838.5	10884.6	23732.8	39605.5	44471.0	52258.2
5	2292.5	3118.5	3465.9	5874.5	7209.7	15755.2	25950.0	29509.0	34434.1
6+	7621.7	9208.4	10385.4	12974.2	17627.4	23785.4	29628.6	32911.5	39190.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2021

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7784.9	10632.2	11615.9	19971.9	24618.2	53746.5	89722.8	100866.6	117205.0
2	6189.7	8691.5	9576.6	16296.6	20122.5	44048.1	72038.3	82300.0	94579.2
3	4945.8	6783.6	7374.3	12610.0	15723.1	34218.5	56058.1	64526.7	74650.6
4	3508.1	4711.6	5175.7	8814.0	10874.0	23639.2	38666.3	44464.9	51634.0
5	2265.5	3120.3	3420.6	5865.7	7223.6	15750.3	26284.2	29513.2	34681.2
6+	8371.6	10288.8	11518.3	14331.7	18966.6	24921.7	30549.0	33935.7	40238.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2022

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7726.9	10631.5	11650.7	20015.8	24661.4	54053.9	87826.3	100862.3	117371.9
2	6352.4	8675.7	9478.4	16296.7	20088.0	43856.3	73212.4	82305.6	95637.5
3	4853.2	6814.7	7508.7	12777.6	15777.4	34536.7	56482.9	64528.8	74156.5
4	3408.0	4674.4	5081.4	8689.2	10834.3	23579.0	38628.1	44463.5	51439.6
5	2328.1	3126.9	3434.8	5849.4	7216.5	15688.1	25660.9	29509.2	34266.9
6+	9033.5	10987.2	12404.2	15239.9	19804.5	25673.4	31548.5	34967.9	40840.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2023

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7848.2	10623.0	11655.3	20016.0	24637.2	53518.6	90144.3	100863.6	116515.1
2	6305.0	8675.2	9506.8	16332.5	20123.3	44107.1	71664.9	82302.1	95773.7
3	4980.7	6802.3	7431.7	12777.7	15750.4	34386.3	57403.5	64533.2	74986.3
4	3344.2	4695.8	5174.0	8804.7	10871.7	23798.2	38920.8	44464.9	51099.1
5	2261.7	3102.2	3372.3	5766.6	7190.2	15648.2	25635.5	29508.2	34137.9

6+	9388.3	11511.0	12830.8	15715.1	20277.1	26305.0	32068.9	35447.0	41415.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2024

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7797.2	10643.4	11658.6	19990.7	24631.8	53652.6	88897.1	100865.9	118061.2
2	6404.0	8668.2	9510.6	16332.8	20103.6	43670.4	73556.3	82303.1	95074.5
3	4943.5	6801.9	7454.0	12805.8	15778.0	34583.0	56190.1	64530.4	75093.0
4	3432.0	4687.3	5121.0	8804.8	10853.1	23694.6	39555.1	44468.0	51670.9
5	2219.4	3116.4	3433.7	5843.2	7215.0	15793.7	25829.8	29509.2	33911.9
6+	9726.6	11764.2	13050.1	15842.4	20540.3	26441.0	32282.5	35622.1	42675.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2025

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7721.8	10640.8	11683.7	19993.5	24651.1	53763.0	89839.0	100867.7	118108.9
2	6362.4	8684.9	9513.2	16312.1	20099.1	43779.7	72538.7	82305.0	96336.1
3	5021.2	6796.5	7456.9	12806.0	15762.6	34240.5	57673.1	64531.2	74544.8
4	3406.5	4687.0	5136.3	8824.1	10872.2	23830.1	38719.0	44466.1	51744.5
5	2277.7	3110.7	3398.5	5843.3	7202.7	15725.0	26250.8	29511.2	34291.4
6+	10011.0	11961.4	13261.6	16225.9	20762.5	26752.9	32600.3	35936.6	42131.8

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2026

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8007.7	10650.5	11717.1	20009.6	24681.5	53874.8	89597.5	100861.1	118487.4
2	6300.9	8682.7	9533.7	16314.3	20114.9	43869.8	73307.2	82306.5	96375.0
3	4988.5	6809.5	7459.0	12789.8	15759.1	34326.2	56875.2	64532.7	75534.0
4	3460.0	4683.2	5138.4	8824.2	10861.5	23594.2	39740.9	44466.6	51366.7
5	2260.7	3110.5	3408.7	5856.1	7215.3	15814.9	25695.9	29509.9	34340.2
6+	10180.5	12083.9	13387.1	16311.2	20918.2	27058.9	32739.3	36041.7	42559.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2027

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7798.3	10656.4	11697.5	20026.9	24612.0	53176.1	88316.0	100862.7	117419.3
2	6534.2	8690.7	9561.0	16327.5	20139.7	43961.0	73110.1	82301.1	96683.8
3	4940.3	6807.8	7475.0	12791.5	15771.5	34396.9	57477.8	64533.9	75564.5
4	3437.5	4692.2	5139.8	8813.1	10859.1	23653.2	39191.1	44467.7	52048.4
5	2296.2	3108.0	3410.1	5856.2	7208.3	15658.3	26374.1	29510.3	34089.5
6+	10337.1	12178.9	13431.3	16323.5	21065.2	27292.0	32898.7	36566.7	42536.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2028

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7681.7	10653.4	11730.0	19967.6	24650.9	53801.3	87747.7	100862.5	117437.9
2	6363.3	8695.5	9545.0	16341.7	20083.0	43390.9	72064.5	82302.4	95812.3
3	5123.2	6814.1	7496.5	12801.9	15790.9	34468.4	57323.3	64529.6	75806.7
4	3404.2	4691.1	5150.8	8814.3	10867.7	23701.9	39606.3	44468.5	52069.4
5	2281.3	3114.0	3411.0	5848.8	7206.7	15697.5	26009.2	29511.0	34541.9
6+	10443.2	12256.6	13508.3	16448.7	21112.1	27133.4	32977.5	36464.4	42780.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2029

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7787.3	10610.2	11641.1	19965.0	24632.0	53708.6	89255.8	100864.1	118647.5

2	6268.2	8693.0	9571.5	16293.2	20114.8	43901.0	71600.7	82302.2	95827.5
3	4989.3	6817.8	7483.9	12813.0	15746.4	34021.4	56503.4	64530.6	75123.3
4	3530.3	4695.4	5165.6	8821.4	10881.1	23751.2	39499.9	44465.5	52236.2
5	2259.2	3113.2	3418.4	5849.6	7212.3	15729.8	26284.7	29511.5	34555.8
6+	10320.3	12291.8	13574.8	16555.3	21225.5	27218.0	32868.9	36222.5	42502.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2030

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7671.5	10655.6	11697.4	20020.0	24673.3	54157.3	88947.2	100865.7	117671.9
2	6354.3	8657.8	9499.0	16291.1	20099.3	43825.4	72831.3	82303.6	96814.5
3	4914.7	6815.9	7504.7	12775.0	15771.4	34421.3	56139.8	64530.5	75135.2
4	3438.0	4698.0	5157.0	8829.1	10850.4	23443.2	38934.9	44466.2	51765.3
5	2342.9	3116.1	3428.1	5854.3	7221.2	15762.5	26214.1	29509.6	34666.6
6+	10560.8	12469.0	13753.5	16619.7	21140.7	27176.2	32891.3	36498.2	43019.5

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2031

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8006.7	10690.6	11898.8	20062.3	24701.1	54064.8	89133.5	100864.4	117557.4
2	6259.8	8694.8	9544.9	16336.0	20133.1	44191.5	72579.5	82304.9	96018.4
3	4982.2	6788.3	7447.9	12773.3	15759.2	34362.1	57104.7	64531.6	75909.2
4	3386.6	4696.7	5171.3	8802.9	10867.6	23718.8	38684.4	44466.1	51773.6
5	2281.6	3117.8	3422.4	5859.4	7200.9	15558.1	25839.2	29510.0	34354.1
6+	10630.7	12468.2	13732.9	16622.9	21271.8	27286.6	33212.2	36548.2	42587.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2032

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7679.3	10615.6	11589.7	19955.7	24676.3	54253.8	89075.1	100862.3	117474.8
2	6533.3	8723.3	9709.2	16370.5	20155.7	44116.1	72731.5	82303.8	95925.0
3	4908.1	6817.3	7483.9	12808.5	15785.7	34649.1	56907.2	64532.6	75284.9
4	3433.1	4677.6	5132.1	8801.7	10859.2	23677.9	39349.2	44466.9	52306.8
5	2247.5	3116.9	3431.9	5842.0	7212.3	15741.0	25672.9	29510.0	34359.5
6+	10440.1	12381.8	13686.4	16567.9	21242.2	27205.7	32877.8	36443.7	42809.8

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2033

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7756.5	10656.8	11721.3	19973.0	24663.4	54079.2	90527.6	100863.2	117853.3
2	6266.2	8662.1	9457.0	16283.5	20135.5	44270.2	72683.9	82302.1	95857.6
3	5122.6	6839.7	7612.7	12835.6	15803.5	34590.0	57026.4	64531.7	75211.7
4	3382.1	4697.6	5156.9	8826.0	10877.5	23875.7	39213.2	44467.6	51876.7
5	2278.4	3104.3	3405.9	5841.3	7206.7	15713.9	26114.1	29510.5	34713.5
6+	10532.9	12423.2	13698.4	16559.5	21234.3	27109.2	32952.1	36599.6	43061.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2034

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7765.3	10578.3	11501.0	19944.8	24608.6	53807.0	88326.3	100860.8	117017.7
2	6329.2	8695.8	9564.4	16297.7	20125.0	44127.8	73869.1	82302.8	96166.5
3	4913.1	6791.7	7414.9	12767.4	15787.6	34710.8	56989.1	64530.4	75158.8
4	3529.8	4713.0	5245.7	8844.6	10889.7	23835.0	39295.3	44467.0	51826.3
5	2244.5	3117.6	3422.4	5857.4	7218.8	15845.1	26023.8	29510.9	34428.0
6+	10454.7	12490.0	13723.7	16580.2	21175.6	27243.7	33093.1	36634.0	42768.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2035

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7674.6	10657.2	11706.4	19993.8	24651.2	53475.3	89043.9	100859.2	118054.1
2	6336.3	8631.7	9384.7	16274.6	20080.2	43905.6	72072.9	82300.9	95484.6
3	4962.5	6818.1	7499.2	12778.5	15779.3	34599.2	57918.4	64530.9	75401.0
4	3385.5	4680.0	5109.4	8797.6	10878.8	23918.3	39269.6	44466.1	51789.8
5	2342.6	3127.8	3481.3	5869.7	7227.0	15818.1	26078.3	29510.5	34394.5
6+	10489.9	12367.3	13652.4	16548.5	21414.3	27430.1	33169.4	36808.1	42768.0

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2036

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7580.1	10640.0	11643.1	19949.8	24666.8	54063.9	88745.6	100855.3	116973.0
2	6262.4	8696.1	9552.2	16314.7	20115.0	43635.0	72658.4	82299.6	96330.3
3	4968.1	6767.8	7358.2	12760.4	15744.3	34425.0	56510.0	64529.4	74866.4
4	3419.5	4698.2	5167.5	8805.3	10873.1	23841.3	39909.9	44466.4	51956.7
5	2246.8	3105.9	3390.9	5838.6	7219.7	15873.4	26061.3	29509.9	34370.3
6+	10461.4	12461.9	13703.2	16692.4	21491.8	27436.0	33177.4	36735.8	42826.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2037

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7853.7	10664.8	11683.8	20028.2	24663.7	54453.8	89288.6	100859.7	117377.3
2	6185.2	8682.0	9500.6	16278.7	20127.7	44115.3	72415.1	82296.4	95448.2
3	4910.1	6818.3	7489.6	12791.8	15771.5	34212.8	56969.1	64528.4	75529.5
4	3423.4	4663.5	5070.3	8792.8	10848.9	23721.3	38939.5	44465.4	51588.3
5	2269.4	3117.9	3429.4	5843.6	7215.9	15822.3	26486.2	29510.2	34481.1
6+	10452.6	12439.5	13758.9	16670.4	21412.3	27428.7	33350.1	36626.8	43133.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2038

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7667.5	10627.8	11710.2	20004.8	24658.5	53929.0	89065.0	100863.2	117072.1
2	6408.5	8702.3	9533.8	16342.7	20125.2	44433.4	72858.1	82300.0	95778.1
3	4849.6	6807.3	7449.1	12763.6	15781.5	34589.4	56778.3	64525.9	74837.8
4	3383.4	4698.3	5160.9	8814.5	10867.7	23575.1	39255.8	44464.7	52045.2
5	2271.9	3095.0	3364.9	5835.4	7199.9	15742.6	25842.2	29509.5	34236.6
6+	10566.5	12476.1	13721.7	16695.5	21455.4	27381.5	33232.2	36674.1	43136.0

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2039

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7490.0	10588.5	11601.5	19920.8	24614.5	53743.3	89038.3	100864.5	117026.6
2	6256.6	8672.1	9555.3	16323.6	20120.9	44005.2	72675.6	82302.8	95529.0
3	5024.7	6823.2	7475.1	12813.8	15779.5	34838.8	57125.7	64528.7	75096.5
4	3341.8	4690.7	5133.0	8795.1	10874.6	23834.6	39124.3	44463.0	51568.6
5	2245.4	3118.0	3425.0	5849.7	7212.4	15645.6	26052.1	29509.0	34539.8
6+	10517.0	12467.8	13732.3	16680.1	21298.2	27491.4	33082.2	36380.5	43321.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2040

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7545.4	10647.5	11618.0	19987.2	24635.1	53042.0	87063.3	100860.7	117018.8
2	6111.7	8640.0	9466.6	16255.1	20085.0	43853.7	72653.8	82303.8	95491.9
3	4905.6	6799.5	7492.0	12798.8	15776.2	34503.1	56982.6	64530.9	74901.2

4	3462.4	4701.7	5150.9	8829.6	10873.2	24006.4	39363.7	44464.9	51746.9
5	2217.8	3113.0	3406.5	5836.8	7216.9	15817.8	25964.9	29507.9	34223.5
6+	10536.7	12497.9	13738.4	16582.1	21279.0	27336.1	33177.4	36751.5	42923.5

REALIZED F SERIES

YEAR	AVG F	STD
2011	0.345	0.065
2012	0.171	0.039
2013	0.210	0.000
2014	0.210	0.000
2015	0.210	0.000
2016	0.210	0.000
2017	0.210	0.000
2018	0.210	0.000
2019	0.210	0.000
2020	0.210	0.000
2021	0.210	0.000
2022	0.210	0.000
2023	0.210	0.000
2024	0.210	0.000
2025	0.210	0.000
2026	0.210	0.000
2027	0.210	0.000
2028	0.210	0.000
2029	0.210	0.000
2030	0.210	0.000
2031	0.210	0.000
2032	0.210	0.000
2033	0.210	0.000
2034	0.210	0.000
2035	0.210	0.000
2036	0.210	0.000
2037	0.210	0.000
2038	0.210	0.000
2039	0.210	0.000
2040	0.210	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.223	0.253	0.267	0.299	0.336	0.384	0.429	0.460	0.533
2012	0.104	0.119	0.128	0.145	0.164	0.192	0.223	0.245	0.287
2013	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2014	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2015	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2016	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2017	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2018	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2019	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2020	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2021	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2022	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2023	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2024	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2025	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2026	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2027	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210

2028	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2029	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2030	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2031	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2032	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2033	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2034	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2035	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2036	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2037	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2038	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2039	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2040	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.250

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.955
2012	0.042
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000

GB Yellowtail Flounder – Rho Adjustment

Rho Adjustment

AGEPRO VERSION 3.3

PROJECTION RUN: Fref=0.25

INPUT FILE: C:\DOCUMENTS AND SETTINGS\TAN\MY DOCUMENTS\PROJECTION_FILES\TRAC 2011\GB YTF\POST_SSC_EXAM\RHO_2650_1150_0.21.IN
OUTPUT FILE: C:\DOCUMENTS AND SETTINGS\TAN\MY DOCUMENTS\PROJECTION_FILES\TRAC 2011\GB YTF\POST_SSC_EXAM\RHO_2650_1150_0.21.OUT
NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION: 10
TOTAL NUMBER OF SIMULATIONS: 10000
NUMBER OF FEASIBLE SIMULATIONS: 10000
PROPORTION OF SIMULATIONS THAT ARE FEASIBLE: 1.00000000000000
NUMBER OF BOOTSTRAP REALIZATIONS: 1000

NUMBER OF RECRUITMENT MODELS: 1
PROBABLE RECRUITMENT MODELS: 15
RECRUITMENT MODELS BY YEAR

YEAR	RECRUITMENT MODELS
2011	15
2012	15
2013	15
2014	15
2015	15
2016	15
2017	15
2018	15
2019	15
2020	15
2021	15
2022	15
2023	15
2024	15
2025	15
2026	15
2027	15
2028	15
2029	15
2030	15
2031	15
2032	15
2033	15
2034	15
2035	15
2036	15
2037	15
2038	15
2039	15
2040	15

RECRUITMENT MODEL PROBABILITIES BY YEAR

YEAR	MODEL PROBABILITY
2011	1.00000000000000

2012	1.00000000000000
2013	1.00000000000000
2014	1.00000000000000
2015	1.00000000000000
2016	1.00000000000000
2017	1.00000000000000
2018	1.00000000000000
2019	1.00000000000000
2020	1.00000000000000
2021	1.00000000000000
2022	1.00000000000000
2023	1.00000000000000
2024	1.00000000000000
2025	1.00000000000000
2026	1.00000000000000
2027	1.00000000000000
2028	1.00000000000000
2029	1.00000000000000
2030	1.00000000000000
2031	1.00000000000000
2032	1.00000000000000
2033	1.00000000000000
2034	1.00000000000000
2035	1.00000000000000
2036	1.00000000000000
2037	1.00000000000000
2038	1.00000000000000
2039	1.00000000000000
2040	1.00000000000000

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2011	10000
2012	10000
2013	10000
2014	10000
2015	10000
2016	10000
2017	10000
2018	10000
2019	10000
2020	10000
2021	10000
2022	10000
2023	10000
2024	10000
2025	10000
2026	10000
2027	10000
2028	10000
2029	10000
2030	10000
2031	10000
2032	10000
2033	10000
2034	10000

2035	10000
2036	10000
2037	10000
2038	10000
2039	10000
2040	10000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2011		2.650
2012		1.150
2013	0.210	
2014	0.210	
2015	0.210	
2016	0.210	
2017	0.210	
2018	0.210	
2019	0.210	
2020	0.210	
2021	0.210	
2022	0.210	
2023	0.210	
2024	0.210	
2025	0.210	
2026	0.210	
2027	0.210	
2028	0.210	
2029	0.210	
2030	0.210	
2031	0.210	
2032	0.210	
2033	0.210	
2034	0.210	
2035	0.210	
2036	0.210	
2037	0.210	
2038	0.210	
2039	0.210	
2040	0.210	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2011	4.338	0.919
2012	3.323	0.971
2013	5.493	2.436
2014	9.189	4.582
2015	12.977	5.765
2016	18.812	7.992
2017	25.358	9.654
2018	30.543	10.479
2019	34.770	11.155
2020	37.905	11.506
2021	39.980	11.666
2022	41.423	11.770
2023	42.380	11.888
2024	43.014	11.947

2025	43.441	11.907
2026	43.741	11.849
2027	43.961	11.837
2028	44.055	11.828
2029	44.083	11.837
2030	44.145	11.890
2031	44.225	11.956
2032	44.325	11.949
2033	44.415	11.960
2034	44.464	11.950
2035	44.453	11.899
2036	44.396	11.925
2037	44.362	12.007
2038	44.399	12.054
2039	44.457	12.035
2040	44.435	12.016

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	2.402	2.925	3.213	3.689	4.325	4.894	5.566	5.899	6.713
2012	1.359	1.787	2.091	2.622	3.284	3.944	4.540	5.044	5.838
2013	2.382	3.011	3.378	4.059	4.942	6.062	7.951	10.663	15.400
2014	4.756	5.394	5.832	6.686	7.897	9.675	13.680	19.304	28.596
2015	6.803	7.553	8.100	9.231	11.046	14.926	20.490	24.777	34.334
2016	9.031	10.285	11.114	12.980	16.506	22.169	30.719	35.750	43.913
2017	11.465	13.527	14.757	17.681	23.351	31.467	38.933	43.494	53.233
2018	13.851	16.476	18.132	22.261	29.152	37.121	44.942	49.859	59.422
2019	15.880	19.029	21.168	26.139	33.553	42.003	49.895	55.042	64.884
2020	17.635	21.112	23.802	29.211	36.739	45.230	53.670	58.596	68.793
2021	19.024	22.880	25.538	31.154	38.849	47.565	55.831	60.904	71.052
2022	20.171	24.129	26.790	32.617	40.290	49.089	57.404	62.576	72.088
2023	21.070	24.947	27.710	33.450	41.231	50.026	58.650	63.406	74.089
2024	21.571	25.506	28.298	33.991	41.913	50.753	59.185	64.266	74.701
2025	21.965	25.915	28.661	34.528	42.382	51.136	59.477	64.607	75.177
2026	22.523	26.270	29.037	34.940	42.612	51.430	59.680	64.867	74.564
2027	22.796	26.484	29.383	35.175	42.870	51.357	60.023	65.364	75.892
2028	22.716	26.556	29.293	35.179	43.033	51.679	59.901	65.537	75.037
2029	22.407	26.609	29.531	35.311	43.103	51.675	60.057	65.319	75.540
2030	22.732	26.830	29.435	35.231	43.047	51.604	60.077	65.819	75.362
2031	22.621	26.680	29.497	35.419	43.119	51.996	60.410	65.753	75.919
2032	22.950	26.767	29.491	35.371	43.338	52.011	60.590	66.163	75.206
2033	22.878	26.782	29.522	35.420	43.292	52.087	60.795	65.994	75.238
2034	22.782	26.786	29.672	35.517	43.380	52.285	60.673	65.844	75.702
2035	22.765	26.897	29.666	35.435	43.429	52.221	60.853	65.677	75.147
2036	22.872	27.127	29.550	35.523	43.215	52.025	60.448	65.806	75.323
2037	22.628	26.710	29.536	35.394	43.159	52.002	60.654	66.152	75.981
2038	22.667	26.736	29.653	35.366	43.295	52.169	60.763	66.098	76.229
2039	22.556	26.702	29.533	35.541	43.290	52.281	60.625	65.980	75.811
2040	22.366	26.680	29.476	35.400	43.431	52.296	60.542	65.915	75.714

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 43.200 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	0.000
2012	0.000
2013	0.000
2014	0.000

2015	0.002
2016	0.012
2017	0.052
2018	0.126
2019	0.220
2020	0.303
2021	0.364
2022	0.405
2023	0.437
2024	0.459
2025	0.475
2026	0.481
2027	0.489
2028	0.495
2029	0.497
2030	0.495
2031	0.497
2032	0.504
2033	0.503
2034	0.505
2035	0.507
2036	0.500
2037	0.499
2038	0.504
2039	0.502
2040	0.507

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 0.969

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2011

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	21.3	29.3	33.3	43.9	59.0	75.7	92.9	106.8	127.7
3	215.2	286.2	326.3	411.8	529.2	669.1	828.1	929.5	1110.8
4	326.3	428.2	487.7	598.0	777.4	938.8	1177.9	1326.2	1616.6
5	816.3	992.5	1106.5	1322.5	1575.2	1861.0	2143.9	2355.4	2702.2
6+	661.9	804.8	897.2	1072.3	1277.2	1508.9	1738.3	1909.8	2191.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2012

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	80.6	169.3	287.4	473.7	696.1	966.2	1163.4	1289.9	1392.8
3	38.1	52.2	60.1	79.8	107.4	140.3	172.0	196.6	247.6
4	106.2	148.7	182.3	251.8	337.5	447.5	566.0	644.0	782.8
5	139.8	199.7	246.9	337.1	462.1	600.4	751.9	882.5	1155.7
6+	482.6	707.1	888.6	1193.4	1588.6	2009.2	2455.4	2788.2	3321.6

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2013

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	922.3	974.9	1025.0	1257.8	1819.3	2430.1	4107.0	6169.0	10914.6
3	161.1	337.2	580.2	961.4	1416.5	1965.8	2376.1	2641.1	2897.9

4	26.0	37.6	44.6	59.7	83.2	111.8	139.2	158.3	200.6
5	63.8	95.9	123.2	180.3	252.8	348.7	445.6	509.0	634.4
6+	276.6	507.5	662.5	951.8	1322.4	1701.0	2112.9	2424.8	2988.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2014

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	926.5	974.8	1018.2	1247.9	1604.9	2135.8	2527.0	3900.4	6530.7
3	1925.9	2035.7	2140.5	2626.5	3798.9	5074.5	8576.0	12882.0	22791.7
4	140.3	293.6	505.2	837.1	1233.4	1711.7	2069.0	2299.7	2523.3
5	22.1	31.9	37.9	50.7	70.7	95.0	118.2	134.4	170.3
6+	250.4	447.6	575.1	808.6	1128.8	1424.9	1763.4	1940.8	2348.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2015

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	920.6	996.7	1098.4	1428.1	2060.9	2751.0	6625.3	9431.2	11837.4
3	1934.7	2035.6	2126.1	2605.7	3351.3	4459.8	5276.8	8144.8	13637.3
4	1677.0	1772.5	1863.8	2287.0	3307.8	4418.5	7467.4	11216.7	19845.4
5	119.1	249.3	428.9	710.7	1047.1	1453.2	1756.5	1952.4	2142.2
6+	193.1	334.9	427.6	590.4	811.8	1016.5	1248.5	1372.6	1646.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2016

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	809.2	1149.9	1247.7	2138.3	2666.0	5803.8	9599.8	10926.0	12818.1
3	1922.3	2081.3	2293.7	2982.2	4303.4	5744.6	13834.8	19693.9	24718.6
4	1684.6	1772.4	1851.2	2268.9	2918.1	3883.3	4594.7	7091.9	11874.4
5	1423.7	1504.8	1582.3	1941.6	2808.3	3751.2	6339.6	9522.7	16848.2
6+	421.7	687.5	851.3	1140.0	1477.0	1867.6	2220.1	2415.2	2794.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2017

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	848.8	1154.6	1283.2	2175.0	2669.3	5833.3	9607.8	10925.6	12749.0
3	1689.8	2401.2	2605.4	4465.1	5567.1	12119.2	20046.1	22815.4	26766.5
4	1673.8	1812.2	1997.2	2596.7	3747.1	5002.0	12046.3	17148.0	21523.2
5	1430.2	1504.8	1571.7	1926.2	2477.4	3296.8	3900.8	6020.8	10081.0
6+	1839.0	2121.3	2301.7	2701.4	3359.8	4278.0	6630.1	9680.2	16211.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2018

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	838.8	1155.3	1266.4	2171.7	2674.5	5831.5	9731.6	10927.1	12840.5
3	1772.4	2411.0	2679.6	4541.8	5574.0	12180.9	20062.8	22814.5	26622.2
4	1471.3	2090.8	2268.6	3887.9	4847.4	10552.6	17454.8	19866.0	23306.4
5	1421.0	1538.5	1695.6	2204.5	3181.2	4246.6	10227.0	14558.2	18272.6
6+	2797.3	3124.1	3363.1	3888.0	4608.8	5689.2	8074.2	10313.0	15530.9

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2019

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	862.0	1157.7	1271.7	2165.7	2671.9	5808.5	9500.8	10925.6	12687.1
3	1751.6	2412.4	2644.6	4535.0	5584.8	12177.1	20321.2	22817.7	26813.3
4	1543.3	2099.4	2333.2	3954.6	4853.5	10606.3	17469.3	19865.2	23180.7
5	1249.1	1775.0	1926.0	3300.7	4115.3	8958.8	14818.6	16865.7	19786.4
6+	3455.2	3887.6	4180.7	4828.5	6006.1	8439.5	13882.1	17512.4	21093.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2020

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	837.4	1148.6	1248.6	2135.1	2662.1	5793.7	9491.4	10925.3	12639.4
3	1800.0	2417.5	2655.6	4522.4	5579.4	12129.1	19839.3	22814.6	26492.9
4	1525.1	2100.5	2302.7	3948.7	4862.8	10602.9	17694.3	19868.0	23347.1
5	1310.2	1782.3	1980.8	3357.4	4120.5	9004.4	14830.9	16865.0	19679.8
6+	4164.1	4911.5	5512.3	6670.0	8948.5	13992.7	18431.3	20539.3	25086.8

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2021

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	821.7	1153.8	1271.3	2163.4	2671.3	5847.5	9563.3	10925.6	12555.7
3	1748.6	2398.4	2607.2	4458.4	5559.0	12098.2	19819.7	22813.9	26393.2
4	1567.3	2105.0	2312.3	3937.8	4858.1	10561.1	17274.7	19865.3	23068.2
5	1294.8	1783.3	1954.9	3352.4	4128.4	9001.6	15022.0	16867.4	19821.0
6+	4920.6	6161.1	6854.9	8387.7	11835.2	16302.2	20425.6	22753.2	27896.6

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2022

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	843.3	1151.7	1258.3	2163.4	2666.8	5822.1	9719.2	10926.4	12696.2
3	1715.9	2409.4	2654.7	4517.6	5578.2	12210.7	19969.9	22814.6	26218.5
4	1522.6	2088.4	2270.2	3882.0	4840.4	10534.2	17257.6	19864.7	22981.4
5	1330.6	1787.1	1963.1	3343.1	4124.4	8966.1	14665.7	16865.1	19584.2
6+	5772.8	7063.3	7950.7	9888.4	13321.1	17825.2	22315.7	24864.3	29403.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2023

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	837.0	1151.7	1262.1	2168.2	2671.4	5855.4	9513.8	10925.9	12714.3
3	1761.0	2405.0	2627.5	4517.7	5568.7	12157.5	20295.4	22816.1	26511.9
4	1494.1	2097.9	2311.6	3933.6	4857.1	10632.2	17388.4	19865.3	22829.2
5	1292.6	1773.0	1927.3	3295.7	4109.4	8943.3	14651.2	16864.6	19510.5
6+	6389.5	7791.8	8727.4	10832.2	14221.5	18898.9	23197.2	25681.5	30241.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2024

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	850.2	1150.7	1262.6	2168.2	2668.8	5797.4	9764.9	10926.0	12621.5
3	1747.8	2404.9	2635.4	4527.6	5578.4	12227.0	19866.4	22815.2	26549.6
4	1533.3	2094.1	2287.9	3933.7	4848.8	10585.9	17671.8	19866.7	23084.7
5	1268.4	1781.1	1962.5	3339.5	4123.5	9026.4	14762.2	16865.1	19381.4

6+	6719.3	8286.8	9248.5	11304.5	14866.3	19345.3	23672.4	26304.5	31508.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2025

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	844.6	1152.9	1262.9	2165.5	2668.2	5811.9	9629.8	10926.3	12789.0
3	1775.3	2402.9	2636.4	4527.6	5573.0	12106.0	20390.7	22815.5	26355.8
4	1521.9	2094.0	2294.7	3942.3	4857.3	10646.4	17298.3	19865.8	23117.6
5	1301.7	1777.8	1942.3	3339.6	4116.5	8987.1	15002.8	16866.2	19598.2
6+	7134.1	8618.4	9569.8	11815.4	15284.4	19842.0	24195.8	26774.3	31384.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2026

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	836.5	1152.7	1265.6	2165.8	2670.3	5823.9	9731.8	10926.5	12794.1
3	1763.7	2407.5	2637.2	4521.9	5571.7	12136.3	20108.6	22816.0	26705.6
4	1545.8	2092.3	2295.6	3942.4	4852.5	10541.0	17754.8	19866.1	22948.8
5	1292.0	1777.7	1948.2	3346.9	4123.7	9038.5	14685.7	16865.5	19626.1
6+	7469.5	8873.4	9840.1	12072.5	15545.0	20181.1	24558.6	27028.4	32075.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2027

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	867.4	1153.7	1269.3	2167.5	2673.6	5836.0	9705.6	10925.8	12835.1
3	1746.7	2407.0	2642.9	4522.5	5576.1	12161.2	20321.7	22816.4	26716.3
4	1535.7	2096.3	2296.3	3937.4	4851.5	10567.4	17509.2	19866.5	23253.3
5	1312.3	1776.3	1948.9	3346.9	4119.7	8949.0	15073.3	16865.7	19482.9
6+	7653.5	9060.7	9984.2	12164.1	15770.1	20454.6	24764.2	27534.7	32146.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2028

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	844.8	1154.4	1267.1	2169.4	2666.1	5760.3	9566.8	10925.9	12719.4
3	1811.4	2409.2	2650.4	4526.2	5583.0	12186.5	20267.0	22814.9	26802.0
4	1520.9	2095.8	2301.2	3937.9	4855.3	10589.2	17694.7	19866.9	23262.7
5	1303.8	1779.7	1949.5	3342.7	4118.8	8971.4	14864.8	16866.1	19741.4
6+	7800.1	9161.3	10112.4	12329.3	15851.5	20456.7	24901.6	27514.8	32380.5

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2029

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	832.1	1154.0	1270.7	2163.0	2670.3	5828.0	9505.3	10925.9	12721.4
3	1764.0	2410.5	2646.0	4530.1	5567.3	12028.5	19977.2	22815.2	26560.4
4	1577.2	2097.7	2307.8	3941.1	4861.3	10611.2	17647.1	19865.6	23337.3
5	1291.2	1779.3	1953.7	3343.2	4122.0	8989.9	15022.3	16866.4	19749.4
6+	7732.7	9241.0	10195.5	12458.5	16017.6	20555.8	24838.9	27412.4	32155.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2030

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2	843.6	1149.4	1261.0	2162.7	2668.3	5818.0	9668.6	10926.1	12852.5
3	1737.6	2409.8	2653.3	4516.7	5576.1	12169.9	19848.6	22815.2	26564.6
4	1536.0	2098.9	2303.9	3944.5	4847.6	10473.6	17394.7	19865.9	23126.9
5	1339.0	1780.9	1959.3	3345.9	4127.1	9008.6	14981.9	16865.3	19812.7
6+	7943.9	9385.2	10371.0	12549.2	15974.4	20563.8	24876.9	27636.5	32581.0

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2031

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.0	1154.3	1267.1	2168.7	2672.7	5866.6	9635.2	10926.3	12746.8
3	1761.5	2400.0	2633.2	4516.1	5571.8	12148.9	20189.7	22815.6	26838.2
4	1513.0	2098.3	2310.3	3932.8	4855.2	10596.7	17282.8	19865.9	23130.5
5	1304.0	1781.9	1956.0	3348.8	4115.4	8891.8	14767.6	16865.6	19634.1
6+	8032.5	9418.5	10379.5	12563.9	16100.6	20656.0	25129.5	27672.5	32266.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2032

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	867.3	1158.1	1288.9	2173.2	2675.7	5856.6	9655.4	10926.1	12734.4
3	1735.3	2410.3	2646.0	4528.5	5581.1	12250.4	20119.9	22815.9	26617.5
4	1533.8	2089.8	2292.8	3932.3	4851.5	10578.4	17579.8	19866.2	23368.8
5	1284.5	1781.4	1961.4	3338.8	4122.0	8996.3	14672.6	16865.5	19637.2
6+	7899.4	9370.6	10359.6	12544.6	16090.5	20587.2	24906.4	27598.6	32433.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2033

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.9	1149.9	1255.5	2161.7	2673.1	5877.0	9649.0	10925.9	12725.4
3	1811.1	2418.2	2691.5	4538.1	5587.4	12229.5	20162.1	22815.6	26591.6
4	1511.0	2098.7	2303.9	3943.1	4859.7	10666.8	17519.0	19866.5	23176.6
5	1302.1	1774.2	1946.6	3338.4	4118.8	8980.8	14924.8	16865.8	19839.4
6+	7963.6	9404.1	10368.9	12547.8	16089.0	20545.7	24979.1	27736.0	32657.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2034

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	840.2	1154.4	1269.7	2163.6	2671.7	5858.1	9806.4	10926.0	12766.4
3	1737.1	2401.3	2621.6	4514.0	5581.8	12272.3	20148.9	22815.2	26572.9
4	1577.0	2105.6	2343.6	3951.5	4865.1	10648.6	17555.7	19866.2	23154.1
5	1282.8	1781.8	1956.0	3347.6	4125.7	9055.8	14873.1	16866.1	19676.3
6+	7922.4	9464.0	10404.4	12566.8	16053.0	20655.8	25099.3	27780.4	32421.3

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2035

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	841.2	1145.9	1245.8	2160.5	2665.7	5828.6	9567.9	10925.7	12675.9
3	1754.5	2410.6	2651.4	4517.9	5578.9	12232.8	20477.4	22815.4	26658.5
4	1512.5	2090.8	2282.7	3930.5	4860.2	10685.8	17544.2	19865.8	23137.8
5	1338.8	1787.6	1989.6	3354.7	4130.4	9040.4	14904.3	16865.9	19657.2
6+	7951.5	9377.2	10353.3	12547.5	16235.9	20806.2	25157.9	27914.6	32439.8

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2036

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	831.4	1154.4	1268.1	2165.8	2670.3	5792.7	9645.7	10925.6	12788.2
3	1756.5	2392.8	2601.5	4511.5	5566.5	12171.2	19979.5	22814.8	26469.5
4	1527.7	2099.0	2308.6	3933.9	4857.7	10651.4	17830.3	19866.0	23212.4
5	1284.1	1775.1	1937.9	3336.9	4126.2	9071.9	14894.5	16865.5	19643.3
6+	7932.2	9448.2	10392.0	12661.0	16300.4	20811.0	25163.1	27865.6	32482.7

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2037

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	821.1	1152.6	1261.2	2161.1	2672.0	5856.5	9613.4	10925.1	12671.1
3	1736.0	2410.7	2648.0	4522.6	5576.1	12096.2	20141.8	22814.5	26704.0
4	1529.4	2083.5	2265.2	3928.3	4846.9	10597.8	17396.7	19865.5	23047.8
5	1297.0	1782.0	1960.0	3339.8	4124.0	9042.8	15137.4	16865.7	19706.6
6+	7927.1	9430.3	10434.4	12644.0	16243.5	20804.8	25300.4	27782.7	32722.2

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2038

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	850.8	1155.3	1265.6	2169.6	2671.7	5898.7	9672.2	10925.6	12714.9
3	1714.6	2406.8	2633.7	4512.7	5579.7	12229.3	20074.3	22813.6	26459.4
4	1511.6	2099.0	2305.7	3938.0	4855.3	10532.5	17538.1	19865.2	23251.9
5	1298.5	1768.8	1923.1	3335.0	4114.9	8997.2	14769.3	16865.3	19566.9
6+	8016.0	9463.7	10408.5	12663.9	16272.1	20770.1	25208.0	27822.1	32725.1

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2039

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	830.6	1151.3	1268.5	2167.0	2671.1	5841.8	9647.9	10926.0	12681.8
3	1776.5	2412.4	2642.9	4530.4	5579.0	12317.5	20197.2	22814.6	26550.9
4	1493.0	2095.6	2293.2	3929.3	4858.4	10648.4	17479.3	19864.4	23039.0
5	1283.3	1782.0	1957.5	3343.2	4122.0	8941.8	14889.3	16865.0	19740.2
6+	7978.2	9456.2	10414.5	12652.8	16157.3	20854.9	25097.0	27600.1	32864.8

PERCENTILES OF SPAWNING BIOMASS AT AGE VECTOR (MT)
IN YEAR: 2040

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	811.3	1147.0	1256.7	2157.9	2666.4	5821.7	9645.1	10926.1	12676.9
3	1734.4	2404.0	2648.9	4525.1	5577.8	12198.8	20146.6	22815.3	26481.8
4	1546.9	2100.5	2301.2	3944.8	4857.8	10725.2	17586.3	19865.3	23118.6
5	1267.5	1779.1	1946.9	3335.9	4124.6	9040.2	14839.5	16864.4	19559.4
6+	7992.0	9480.6	10422.1	12578.9	16143.3	20737.9	25169.2	27879.5	32563.0

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2011	5.032	0.993
2012	6.452	2.607
2013	10.021	4.795
2014	14.359	6.378

2015	20.528	8.540
2016	27.769	10.430
2017	34.305	11.640
2018	39.342	12.340
2019	43.350	12.879
2020	46.408	13.175
2021	48.498	13.344
2022	49.912	13.488
2023	50.835	13.566
2024	51.439	13.548
2025	51.874	13.471
2026	52.184	13.455
2027	52.343	13.459
2028	52.409	13.459
2029	52.484	13.501
2030	52.588	13.577
2031	52.708	13.594
2032	52.800	13.611
2033	52.866	13.597
2034	52.862	13.542
2035	52.819	13.551
2036	52.785	13.641
2037	52.822	13.704
2038	52.880	13.702
2039	52.858	13.670
2040	52.739	13.619

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	3.014	3.470	3.773	4.306	4.997	5.668	6.288	6.793	7.620
2012	3.070	3.764	4.164	4.908	5.865	7.089	9.107	12.007	16.898
2013	5.179	5.955	6.423	7.381	8.679	10.587	14.741	20.703	30.160
2014	7.573	8.415	9.006	10.237	12.232	16.404	22.545	27.454	38.038
2015	10.005	11.383	12.293	14.313	18.103	24.116	33.135	38.380	47.514
2016	12.821	15.022	16.330	19.540	25.546	34.309	42.369	47.470	57.880
2017	15.840	18.703	20.526	25.135	32.678	41.478	50.218	55.950	66.445
2018	18.354	21.874	24.350	29.830	38.116	47.176	56.175	61.659	72.489
2019	20.496	24.587	27.527	33.633	42.020	51.620	60.981	66.400	77.633
2020	22.390	26.861	30.102	36.563	45.219	54.891	64.224	69.883	81.634
2021	23.920	28.628	31.853	38.550	47.343	57.216	66.337	72.102	83.374
2022	25.179	29.857	33.183	39.889	48.650	58.640	68.121	73.650	85.560
2023	26.008	30.698	34.048	40.741	49.691	59.523	69.098	74.812	86.703
2024	26.566	31.258	34.619	41.394	50.327	60.284	69.611	75.117	86.949
2025	27.168	31.799	35.091	41.879	50.725	60.659	69.849	75.742	86.936
2026	27.556	32.054	35.488	42.267	50.954	60.696	70.225	76.173	88.226
2027	27.603	32.050	35.458	42.542	51.243	61.005	70.482	76.534	87.402
2028	27.165	32.213	35.744	42.499	51.405	61.021	70.528	76.431	87.968
2029	27.546	32.528	35.641	42.468	51.420	61.095	70.455	76.775	87.743
2030	27.468	32.234	35.922	42.657	51.340	61.323	71.090	76.671	88.545
2031	27.834	32.426	35.757	42.679	51.611	61.476	70.987	77.429	88.390
2032	27.613	32.509	35.720	42.657	51.683	61.549	71.327	77.223	87.682
2033	27.653	32.511	35.959	42.736	51.735	61.684	71.327	76.640	87.487
2034	27.721	32.543	35.957	42.722	51.707	61.799	71.298	76.795	87.634
2035	27.796	32.714	35.977	42.806	51.532	61.482	71.223	76.875	87.522
2036	27.525	32.445	35.850	42.818	51.574	61.467	71.123	77.338	88.522
2037	27.676	32.527	35.900	42.620	51.748	61.645	71.435	77.295	88.819

2038	27.436	32.503	35.837	42.771	51.640	61.862	71.231	77.228	88.620
2039	27.222	32.452	35.793	42.738	51.774	61.767	71.135	76.996	88.059
2040	27.526	32.562	35.819	42.767	51.507	61.569	71.312	77.206	87.680

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2011	0.548	0.113
2012	0.200	0.061
2013	0.085	0.015
2014	0.107	0.018
2015	0.111	0.023
2016	0.117	0.025
2017	0.130	0.024
2018	0.140	0.023
2019	0.147	0.022
2020	0.152	0.021
2021	0.154	0.020
2022	0.156	0.020
2023	0.157	0.019
2024	0.157	0.019

2025	0.158	0.019
2026	0.158	0.019
2027	0.158	0.019
2028	0.159	0.019
2029	0.158	0.019
2030	0.158	0.019
2031	0.158	0.019
2032	0.158	0.019
2033	0.158	0.019
2034	0.159	0.019
2035	0.159	0.019
2036	0.159	0.019
2037	0.159	0.019
2038	0.158	0.019
2039	0.159	0.019
2040	0.159	0.019

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.347	0.389	0.421	0.467	0.530	0.615	0.701	0.762	0.874
2012	0.068	0.096	0.126	0.162	0.196	0.234	0.276	0.305	0.374
2013	0.051	0.060	0.065	0.074	0.086	0.096	0.105	0.110	0.119
2014	0.064	0.075	0.083	0.096	0.108	0.119	0.129	0.136	0.150
2015	0.064	0.072	0.078	0.093	0.113	0.127	0.140	0.147	0.164
2016	0.069	0.077	0.084	0.097	0.118	0.135	0.150	0.157	0.167
2017	0.078	0.089	0.097	0.112	0.132	0.149	0.160	0.167	0.177
2018	0.087	0.100	0.108	0.124	0.143	0.158	0.169	0.174	0.182
2019	0.094	0.108	0.117	0.132	0.150	0.165	0.174	0.178	0.185
2020	0.099	0.114	0.122	0.137	0.155	0.168	0.177	0.181	0.187
2021	0.102	0.117	0.126	0.140	0.157	0.170	0.178	0.182	0.188
2022	0.105	0.120	0.128	0.142	0.158	0.171	0.179	0.183	0.189
2023	0.107	0.121	0.129	0.143	0.159	0.172	0.180	0.183	0.190
2024	0.108	0.123	0.130	0.144	0.160	0.173	0.180	0.184	0.190
2025	0.109	0.122	0.130	0.144	0.160	0.173	0.181	0.184	0.190
2026	0.109	0.123	0.130	0.145	0.161	0.173	0.181	0.184	0.190
2027	0.110	0.124	0.132	0.145	0.161	0.173	0.181	0.185	0.191
2028	0.112	0.124	0.132	0.146	0.162	0.174	0.181	0.184	0.190
2029	0.110	0.124	0.132	0.146	0.161	0.173	0.181	0.185	0.190
2030	0.111	0.124	0.132	0.145	0.161	0.173	0.181	0.184	0.190
2031	0.110	0.124	0.131	0.145	0.161	0.173	0.181	0.184	0.190
2032	0.111	0.124	0.132	0.145	0.161	0.173	0.181	0.184	0.190
2033	0.110	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2034	0.111	0.124	0.131	0.145	0.161	0.174	0.181	0.185	0.190
2035	0.111	0.124	0.132	0.146	0.162	0.174	0.181	0.185	0.191
2036	0.110	0.125	0.133	0.146	0.161	0.174	0.181	0.184	0.190
2037	0.112	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2038	0.110	0.124	0.132	0.145	0.161	0.174	0.181	0.185	0.190
2039	0.109	0.123	0.131	0.146	0.162	0.174	0.181	0.185	0.190
2040	0.112	0.124	0.132	0.146	0.162	0.174	0.181	0.185	0.191

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000

2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2011	5.597	0.881
2012	3.201	0.908
2013	3.508	1.160
2014	7.697	4.429
2015	10.579	4.865
2016	15.436	7.572
2017	22.564	9.712
2018	28.157	10.561
2019	32.955	11.423
2020	36.738	11.885
2021	39.141	12.119
2022	40.857	12.198
2023	41.976	12.330
2024	42.736	12.421
2025	43.237	12.437
2026	43.580	12.370
2027	43.832	12.337
2028	44.011	12.323
2029	44.009	12.299
2030	44.078	12.355
2031	44.131	12.418
2032	44.230	12.463
2033	44.334	12.406
2034	44.404	12.480
2035	44.438	12.405
2036	44.377	12.376

2037	44.328	12.452
2038	44.311	12.533
2039	44.400	12.541
2040	44.418	12.512

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	3.759	4.252	4.518	4.965	5.566	6.136	6.776	7.105	7.942
2012	1.381	1.804	2.086	2.552	3.178	3.751	4.444	4.769	5.578
2013	1.118	1.785	2.049	2.664	3.433	4.267	5.025	5.426	6.559
2014	3.482	4.134	4.536	5.339	6.454	8.093	11.773	17.024	27.170
2015	5.653	6.355	6.837	7.831	9.207	11.277	15.612	21.028	30.202
2016	7.617	8.531	9.122	10.423	12.654	17.522	27.235	32.289	40.076
2017	9.926	11.497	12.663	14.856	19.812	28.927	36.125	40.872	51.565
2018	12.133	14.671	16.084	19.442	26.533	35.078	42.678	47.990	57.463
2019	14.502	17.358	19.277	23.921	31.677	39.993	48.739	53.912	63.918
2020	16.404	19.674	22.015	27.650	35.529	44.495	53.096	58.090	68.574
2021	17.782	21.565	24.313	29.887	37.964	46.960	55.594	61.038	71.312
2022	19.098	23.115	25.687	31.612	39.629	48.609	57.531	62.945	73.034
2023	19.896	23.969	26.687	32.759	40.671	49.933	58.908	63.771	74.679
2024	20.914	24.673	27.330	33.351	41.512	50.787	59.573	65.125	75.532
2025	21.408	25.008	27.867	33.909	42.039	51.249	59.895	65.415	76.392
2026	21.597	25.446	28.091	34.133	42.518	51.739	60.427	65.740	75.714
2027	22.038	25.885	28.635	34.492	42.626	51.696	60.357	66.100	77.119
2028	22.342	25.945	28.652	34.793	42.955	51.960	60.696	66.777	76.363
2029	22.058	25.810	28.767	34.726	42.884	51.907	60.698	65.760	76.545
2030	21.997	26.016	28.738	34.869	43.009	51.892	60.654	66.182	76.755
2031	21.953	26.131	28.866	34.754	42.951	52.026	61.138	66.227	77.571
2032	22.244	26.083	28.704	34.842	43.120	52.215	61.213	66.636	76.912
2033	22.304	26.208	28.892	34.987	43.158	52.335	61.453	66.877	76.938
2034	22.165	26.139	28.912	35.021	43.177	52.505	61.360	66.857	77.138
2035	22.164	26.127	29.026	35.123	43.379	52.362	61.339	66.795	76.196
2036	22.243	26.210	29.130	35.005	43.239	52.507	60.886	66.327	77.073
2037	22.300	26.338	28.816	34.903	43.144	52.363	61.216	66.814	77.571
2038	22.330	26.071	28.852	35.032	43.029	52.287	61.280	66.984	77.554
2039	22.094	26.030	28.808	34.969	43.282	52.406	61.521	66.653	77.312
2040	21.996	25.905	28.767	35.086	43.376	52.525	61.409	66.799	77.553

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000

2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2011	21248.913	17658.390
2012	17483.858	10450.875
2013	27086.362	23453.028
2014	38691.061	29034.431
2015	39015.768	28956.038
2016	39301.197	29217.726
2017	38881.723	28700.215
2018	38390.513	28833.363
2019	39023.987	28868.223
2020	38978.034	29166.332
2021	39079.530	28950.768
2022	38892.919	29052.793
2023	38976.775	29103.324
2024	39065.380	29196.806
2025	39130.751	29053.828
2026	38557.098	28753.987
2027	38964.266	28878.825
2028	38978.895	29073.805
2029	39321.988	29091.314
2030	39309.032	28993.072
2031	39251.663	29039.566
2032	39128.327	29187.736
2033	38810.575	28982.166
2034	38880.716	29002.097
2035	39018.159	28955.870
2036	39485.752	29197.761
2037	39155.565	29205.289
2038	38792.920	29000.091
2039	38351.608	28617.199
2040	38943.367	29047.720

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	8555.765	9047.374	9511.379	11655.741	16875.612	22560.795	37994.431	56978.727	100874.749

2012	8553.035	8999.020	9399.101	11519.555	14815.618	19716.172	23327.988	36006.703	60288.357
2013	8498.350	9200.973	10140.197	13183.756	19024.762	25396.121	61161.434	87063.603	109277.223
2014	7470.300	10615.332	11518.212	19739.716	24611.214	53577.322	88620.875	100863.298	118330.558
2015	7835.477	10658.787	11846.165	20078.390	24641.989	53849.837	88694.692	100859.287	117692.723
2016	7743.371	10664.847	11691.170	20048.409	24689.513	53833.000	89837.132	100873.409	118537.307
2017	7957.312	10687.419	11739.940	19992.828	24665.477	53620.724	87706.673	100859.769	117121.234
2018	7730.351	10602.980	11526.222	19709.717	24575.511	53484.180	87619.971	100856.586	116680.471
2019	7585.606	10651.496	11736.221	19971.686	24660.361	53981.524	88283.914	100859.767	115908.073
2020	7784.913	10632.183	11615.899	19971.868	24618.166	53746.525	89722.794	100866.626	117205.043
2021	7726.855	10631.546	11650.748	20015.758	24661.369	54053.878	87826.321	100862.294	117371.910
2022	7848.219	10623.001	11655.313	20016.022	24637.206	53518.630	90144.291	100863.626	116515.081
2023	7797.186	10643.410	11658.583	19990.680	24631.768	53652.601	88897.123	100865.940	118061.246
2024	7721.813	10640.775	11683.654	19993.450	24651.143	53763.015	89838.971	100867.738	118108.861
2025	8007.722	10650.535	11717.105	20009.590	24681.498	53874.840	89597.480	100861.081	118487.365
2026	7798.345	10656.433	11697.525	20026.929	24611.974	53176.120	88315.980	100862.687	117419.251
2027	7681.721	10653.408	11730.002	19967.580	24650.941	53801.255	87747.682	100862.454	117437.877
2028	7787.312	10610.241	11641.148	19964.960	24631.953	53708.613	89255.790	100864.141	118647.542
2029	7671.512	10655.648	11697.446	20020.000	24673.326	54157.290	88947.156	100865.721	117671.898
2030	8006.702	10690.566	11898.784	20062.266	24701.122	54064.838	89133.494	100864.417	117557.447
2031	7679.255	10615.576	11589.680	19955.678	24676.313	54253.752	89075.131	100862.305	117474.770
2032	7756.529	10656.837	11721.335	19973.026	24663.406	54079.211	90527.635	100863.177	117853.309
2033	7765.272	10578.270	11501.033	19944.786	24608.613	53806.969	88326.323	100860.824	117017.658
2034	7674.628	10657.179	11706.410	19993.828	24651.208	53475.269	89043.874	100859.220	118054.078
2035	7580.087	10639.958	11643.143	19949.828	24666.804	54063.926	88745.629	100855.311	116973.012
2036	7853.706	10664.834	11683.805	20028.233	24663.727	54453.762	89288.610	100859.727	117377.341
2037	7667.497	10627.762	11710.166	20004.848	24658.478	53928.976	89064.953	100863.154	117072.053
2038	7489.963	10588.492	11601.498	19920.801	24614.489	53743.277	89038.263	100864.479	117026.631
2039	7545.411	10647.550	11618.015	19987.165	24635.134	53042.021	87063.259	100860.719	117018.790
2040	7833.248	10644.706	11664.636	19960.444	24645.630	53725.230	89465.911	100863.742	117251.613

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2011	2.650	0.000
2012	1.150	0.000
2013	0.826	0.305
2014	1.529	0.781
2015	2.216	0.985
2016	3.201	1.389
2017	4.455	1.756
2018	5.509	1.946
2019	6.376	2.094
2020	7.026	2.172
2021	7.446	2.208
2022	7.737	2.226
2023	7.931	2.247
2024	8.062	2.263
2025	8.150	2.262
2026	8.210	2.250
2027	8.253	2.244
2028	8.279	2.242
2029	8.284	2.242
2030	8.293	2.252
2031	8.306	2.263
2032	8.324	2.267
2033	8.343	2.264
2034	8.355	2.267

2035	8.357	2.259
2036	8.347	2.259
2037	8.338	2.272
2038	8.339	2.283
2039	8.351	2.282
2040	8.353	2.279

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	2.650	2.650	2.650	2.650	2.650	2.650	2.650	2.650	2.650
2012	1.150	1.150	1.150	1.150	1.150	1.150	1.150	1.150	1.150
2013	0.337	0.449	0.511	0.626	0.776	0.950	1.192	1.459	1.890
2014	0.761	0.880	0.952	1.103	1.312	1.613	2.296	3.207	4.898
2015	1.181	1.321	1.418	1.613	1.919	2.472	3.282	4.290	6.063
2016	1.603	1.814	1.954	2.258	2.756	3.646	5.333	6.204	7.657
2017	2.078	2.401	2.621	3.085	3.977	5.570	6.910	7.806	9.687
2018	2.530	2.964	3.269	3.929	5.231	6.756	8.169	9.132	10.848
2019	2.922	3.466	3.841	4.718	6.170	7.677	9.242	10.207	12.041
2020	3.266	3.882	4.362	5.379	6.805	8.439	10.007	10.900	12.833
2021	3.548	4.223	4.717	5.760	7.225	8.872	10.456	11.419	13.324
2022	3.754	4.494	4.975	6.068	7.512	9.166	10.771	11.740	13.558
2023	3.923	4.643	5.163	6.247	7.704	9.365	10.979	11.880	13.892
2024	4.032	4.777	5.268	6.345	7.858	9.517	11.140	12.114	14.083
2025	4.142	4.843	5.348	6.447	7.940	9.608	11.187	12.197	14.142
2026	4.197	4.912	5.410	6.525	8.001	9.694	11.238	12.243	14.002
2027	4.279	4.965	5.480	6.566	8.039	9.688	11.297	12.281	14.244
2028	4.279	4.972	5.479	6.600	8.079	9.716	11.299	12.361	14.170
2029	4.257	4.976	5.497	6.607	8.090	9.729	11.355	12.260	14.217
2030	4.248	5.007	5.504	6.611	8.094	9.719	11.310	12.372	14.201
2031	4.255	5.001	5.536	6.605	8.105	9.752	11.385	12.349	14.379
2032	4.308	5.006	5.498	6.607	8.122	9.785	11.386	12.462	14.287
2033	4.305	5.024	5.526	6.630	8.147	9.804	11.457	12.454	14.195
2034	4.268	5.025	5.552	6.650	8.154	9.843	11.430	12.411	14.271
2035	4.308	5.028	5.556	6.645	8.160	9.826	11.433	12.352	14.150
2036	4.308	5.046	5.531	6.643	8.128	9.818	11.387	12.389	14.290
2037	4.251	5.030	5.530	6.636	8.120	9.790	11.418	12.424	14.359
2038	4.278	5.029	5.520	6.628	8.128	9.799	11.423	12.442	14.381
2039	4.252	5.001	5.523	6.638	8.141	9.830	11.443	12.396	14.282
2040	4.224	5.004	5.510	6.638	8.147	9.833	11.427	12.462	14.301

RETROSPECTIVE ADJUSTMENT COEFFICIENTS WERE APPLIED
TO THE POPULATION NUMBERS AT AGE IN YEAR: 2011

AGE	COEFFICIENT
1	0.587
2	0.587
3	0.587
4	0.587
5	0.587
6	0.587

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2011

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	792.6	1615.0	2768.4	4461.9	6587.3	9146.7	10962.2	12072.8	13000.3
2	166.4	230.3	262.4	344.3	461.4	592.1	731.1	834.1	986.6
3	721.3	994.3	1120.8	1389.0	1754.1	2198.4	2679.3	3003.8	3580.0

4	944.2	1217.9	1404.8	1692.2	2095.0	2519.3	3097.3	3461.2	4090.6
5	2043.2	2373.7	2563.7	2921.1	3337.6	3809.2	4266.7	4608.4	5141.5
6+	1248.0	1449.9	1566.0	1784.3	2038.6	2326.7	2606.2	2814.9	3140.5

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2012

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8555.8	9047.4	9511.4	11655.7	16875.6	22560.8	37994.4	56978.7	100874.7
2	639.3	1307.4	2249.2	3622.9	5327.3	7411.1	8884.7	9786.5	10539.7
3	119.6	163.7	186.2	246.3	329.9	424.5	520.3	601.2	710.7
4	314.6	404.1	482.8	633.1	828.0	1071.2	1332.8	1516.0	1831.0
5	308.6	435.2	497.6	660.5	883.7	1110.1	1395.6	1638.3	2047.8
6+	878.1	1194.0	1400.4	1786.5	2272.7	2805.8	3360.8	3748.8	4392.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2013

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8553.0	8999.0	9399.1	11519.6	14815.6	19716.2	23328.0	36006.7	60288.4
2	6947.5	7343.5	7721.4	9474.8	13704.0	18305.3	30936.7	46469.7	82217.4
3	455.8	953.8	1641.0	2719.1	4006.3	5560.1	6720.6	7470.2	8196.4
4	58.3	84.2	99.8	133.7	186.3	250.3	311.6	354.3	449.0
5	111.7	167.8	215.6	315.4	442.3	610.1	779.7	890.7	1110.0
6+	364.6	669.0	873.3	1254.6	1743.1	2242.1	2785.0	3196.2	3938.8

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2014

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8498.3	9201.0	10140.2	13183.8	19024.8	25396.1	61161.4	87063.6	109277.2
2	6979.1	7343.1	7669.5	9399.8	12089.3	16088.1	19035.3	29380.9	49194.4
3	5447.3	5757.8	6054.1	7428.8	10744.9	14352.6	24256.5	36435.4	64464.0
4	314.0	657.2	1130.8	1873.7	2760.6	3831.3	4631.0	5147.5	5647.9
5	38.7	55.9	66.2	88.7	123.6	166.1	206.8	235.1	298.0
6+	330.0	590.0	758.1	1065.9	1487.8	1878.2	2324.4	2558.3	3095.3

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2015

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7470.3	10615.3	11518.2	19739.7	24611.2	53577.3	88620.9	100863.3	118330.6
2	6934.5	7507.9	8274.2	10757.7	15523.9	20722.8	49906.8	71042.5	89168.5
3	5472.1	5757.5	6013.4	7370.1	9478.8	12614.2	14924.9	23036.6	38571.7
4	3753.6	3967.5	4171.7	5119.0	7404.0	9890.0	16714.4	25106.6	44420.3
5	208.4	436.2	750.5	1243.5	1832.1	2542.7	3073.4	3416.2	3748.3
6+	254.5	441.4	563.7	778.2	1070.1	1339.8	1645.7	1809.2	2170.0

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2016

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7835.5	10658.8	11846.2	20078.4	24642.0	53849.8	88694.7	100859.3	117692.7
2	6095.6	8661.9	9398.7	16107.3	20082.4	43718.3	72313.3	82302.9	96555.9
3	5437.1	5886.7	6487.6	8434.8	12171.8	16248.1	39130.3	55702.2	69914.1
4	3770.7	3967.3	4143.7	5078.5	6531.6	8692.1	10284.4	15873.9	26578.7
5	2491.1	2633.0	2768.6	3397.2	4913.7	6563.5	11092.5	16662.0	29479.5
6+	555.8	906.2	1122.1	1502.7	1946.9	2461.7	2926.3	3183.5	3683.0

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2017

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7743.4	10664.8	11691.2	20048.4	24689.5	53833.0	89837.1	100873.4	118537.3
2	6393.6	8697.4	9666.3	16383.7	20107.5	43940.6	72373.5	82299.6	96035.4
3	4779.4	6791.6	7369.2	12629.2	15745.9	34278.1	56698.5	64531.0	75706.4
4	3746.6	4056.3	4470.4	5812.2	8387.2	11196.1	26963.6	38382.8	48175.9
5	2502.4	2632.9	2750.0	3370.3	4334.7	5768.5	6825.2	10534.7	17638.9
6+	2424.0	2796.1	3033.9	3560.7	4428.7	5638.9	8739.3	12759.7	21368.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2018

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7957.3	10687.4	11739.9	19992.8	24665.5	53620.7	87706.7	100859.8	117121.2
2	6318.5	8702.3	9539.8	16359.2	20146.3	43926.9	73305.7	82311.1	96724.6
3	5013.0	6819.4	7579.0	12845.9	15765.6	34452.4	56745.7	64528.5	75298.3
4	3293.3	4679.9	5077.9	8702.4	10850.1	23620.0	39069.3	44466.5	52167.1
5	2486.4	2692.0	2966.8	3857.3	5566.2	7430.3	17894.4	25472.7	31971.9
6+	3687.2	4118.0	4433.0	5124.9	6075.0	7499.1	10642.7	13593.7	20471.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2019

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7730.4	10603.0	11526.2	19709.7	24575.5	53484.2	87620.0	100856.6	116680.5
2	6493.0	8720.8	9579.6	16313.8	20126.6	43753.7	71567.3	82300.0	95569.1
3	4954.1	6823.2	7479.9	12826.7	15796.0	34441.7	57476.6	64537.5	75838.6
4	3454.3	4699.0	5222.5	8851.7	10863.6	23740.2	39101.9	44464.7	51885.9
5	2185.6	3105.8	3370.0	5775.4	7200.7	15675.5	25928.4	29510.2	34620.7
6+	4554.4	5124.3	5510.6	6364.6	7916.8	11124.2	18298.3	23083.5	27803.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2020

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7585.6	10651.5	11736.2	19971.7	24660.4	53981.5	88283.9	100859.8	115908.1
2	6307.8	8651.9	9405.2	16082.8	20053.2	43642.3	71496.5	82297.4	95209.4
3	5091.0	6837.7	7511.1	12791.2	15780.7	34305.8	56113.6	64528.8	74932.6
4	3413.7	4701.7	5154.2	8838.5	10884.6	23732.8	39605.5	44471.0	52258.2
5	2292.5	3118.5	3465.9	5874.5	7209.7	15755.2	25950.0	29509.0	34434.1
6+	5488.8	6474.0	7265.9	8791.9	11795.2	18444.0	24294.7	27073.3	33067.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2021

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7784.9	10632.2	11615.9	19971.9	24618.2	53746.5	89722.8	100866.6	117205.0
2	6189.7	8691.5	9576.6	16296.6	20122.5	44048.1	72038.3	82300.0	94579.2
3	4945.8	6783.6	7374.3	12610.0	15723.1	34218.5	56058.1	64526.7	74650.6
4	3508.1	4711.6	5175.7	8814.0	10874.0	23639.2	38666.3	44464.9	51634.0
5	2265.5	3120.3	3420.6	5865.7	7223.6	15750.3	26284.2	29513.2	34681.2
6+	6485.9	8121.1	9035.6	11055.9	15600.3	21488.2	26923.5	29991.5	36771.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2022

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7726.9	10631.5	11650.7	20015.8	24661.4	54053.9	87826.3	100862.3	117371.9
2	6352.4	8675.7	9478.4	16296.7	20088.0	43856.3	73212.4	82305.6	95637.5
3	4853.2	6814.7	7508.7	12777.6	15777.4	34536.7	56482.9	64528.8	74156.5
4	3408.0	4674.4	5081.4	8689.2	10834.3	23579.0	38628.1	44463.5	51439.6
5	2328.1	3126.9	3434.8	5849.4	7216.5	15688.1	25660.9	29509.2	34266.9

6+	7609.2	9310.3	10480.0	13034.1	17558.8	23495.8	29414.8	32774.2	38757.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2023

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7848.2	10623.0	11655.3	20016.0	24637.2	53518.6	90144.3	100863.6	116515.1
2	6305.0	8675.2	9506.8	16332.5	20123.3	44107.1	71664.9	82302.1	95773.7
3	4980.7	6802.3	7431.7	12777.7	15750.4	34386.3	57403.5	64533.2	74986.3
4	3344.2	4695.8	5174.0	8804.7	10871.7	23798.2	38920.8	44464.9	51099.1
5	2261.7	3102.2	3372.3	5766.6	7190.2	15648.2	25635.5	29508.2	34137.9
6+	8422.1	10270.6	11503.7	14278.1	18745.7	24911.1	30576.8	33851.3	39862.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2024

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7797.2	10643.4	11658.6	19990.7	24631.8	53652.6	88897.1	100865.9	118061.2
2	6404.0	8668.2	9510.6	16332.8	20103.6	43670.4	73556.3	82303.1	95074.5
3	4943.5	6801.9	7454.0	12805.8	15778.0	34583.0	56190.1	64530.4	75093.0
4	3432.0	4687.3	5121.0	8804.8	10853.1	23694.6	39555.1	44468.0	51670.9
5	2219.4	3116.4	3433.7	5843.2	7215.0	15793.7	25829.8	29509.2	33911.9
6+	8856.9	10923.0	12190.7	14900.7	19595.6	25499.5	31203.0	34672.6	41531.8

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2025

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7721.8	10640.8	11683.7	19993.5	24651.1	53763.0	89839.0	100867.7	118108.9
2	6362.4	8684.9	9513.2	16312.1	20099.1	43779.7	72538.7	82305.0	96336.1
3	5021.2	6796.5	7456.9	12806.0	15762.6	34240.5	57673.1	64531.2	74544.8
4	3406.5	4687.0	5136.3	8824.1	10872.2	23830.1	38719.0	44466.1	51744.5
5	2277.7	3110.7	3398.5	5843.3	7202.7	15725.0	26250.8	29511.2	34291.4
6+	9403.6	11360.1	12614.2	15574.1	20146.7	26154.1	31893.1	35291.8	41368.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2026

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8007.7	10650.5	11717.1	20009.6	24681.5	53874.8	89597.5	100861.1	118487.4
2	6300.9	8682.7	9533.7	16314.3	20114.9	43869.8	73307.2	82306.5	96375.0
3	4988.5	6809.5	7459.0	12789.8	15759.1	34326.2	56875.2	64532.7	75534.0
4	3460.0	4683.2	5138.4	8824.2	10861.5	23594.2	39740.9	44466.6	51366.7
5	2260.7	3110.5	3408.7	5856.1	7215.3	15814.9	25695.9	29509.9	34340.2
6+	9845.7	11696.2	12970.4	15913.1	20490.2	26601.2	32371.2	35626.7	42279.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2027

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7798.3	10656.4	11697.5	20026.9	24612.0	53176.1	88316.0	100862.7	117419.3
2	6534.2	8690.7	9561.0	16327.5	20139.7	43961.0	73110.1	82301.1	96683.8
3	4940.3	6807.8	7475.0	12791.5	15771.5	34396.9	57477.8	64533.9	75564.5
4	3437.5	4692.2	5139.8	8813.1	10859.1	23653.2	39191.1	44467.7	52048.4
5	2296.2	3108.0	3410.1	5856.2	7208.3	15658.3	26374.1	29510.3	34089.5
6+	10088.3	11943.1	13160.3	16033.8	20786.9	26961.6	32642.3	36294.1	42372.5

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2028

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7681.7	10653.4	11730.0	19967.6	24650.9	53801.3	87747.7	100862.5	117437.9

2	6363.3	8695.5	9545.0	16341.7	20083.0	43390.9	72064.5	82302.4	95812.3
3	5123.2	6814.1	7496.5	12801.9	15790.9	34468.4	57323.3	64529.6	75806.7
4	3404.2	4691.1	5150.8	8814.3	10867.7	23701.9	39606.3	44468.5	52069.4
5	2281.3	3114.0	3411.0	5848.8	7206.7	15697.5	26009.2	29511.0	34541.9
6+	10281.5	12075.8	13329.4	16251.6	20894.2	26964.4	32823.4	36267.8	42681.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2029

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7787.3	10610.2	11641.1	19965.0	24632.0	53708.6	89255.8	100864.1	118647.5
2	6268.2	8693.0	9571.5	16293.2	20114.8	43901.0	71600.7	82302.2	95827.5
3	4989.3	6817.8	7483.9	12813.0	15746.4	34021.4	56503.4	64530.6	75123.3
4	3530.3	4695.4	5165.6	8821.4	10881.1	23751.2	39499.9	44465.5	52236.2
5	2259.2	3113.2	3418.4	5849.6	7212.3	15729.8	26284.7	29511.5	34555.8
6+	10192.6	12180.7	13439.0	16421.9	21113.2	27095.0	32740.6	36132.9	42384.3

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2030

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7671.5	10655.6	11697.4	20020.0	24673.3	54157.3	88947.2	100865.7	117671.9
2	6354.3	8657.8	9499.0	16291.1	20099.3	43825.4	72831.3	82303.6	96814.5
3	4914.7	6815.9	7504.7	12775.0	15771.4	34421.3	56139.8	64530.5	75135.2
4	3438.0	4698.0	5157.0	8829.1	10850.4	23443.2	38934.9	44466.2	51765.3
5	2342.9	3116.1	3428.1	5854.3	7221.2	15762.5	26214.1	29509.6	34666.6
6+	10471.0	12370.8	13670.2	16541.3	21056.2	27105.5	32790.8	36428.2	42945.7

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2031

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	8006.7	10690.6	11898.8	20062.3	24701.1	54064.8	89133.5	100864.4	117557.4
2	6259.8	8694.8	9544.9	16336.0	20133.1	44191.5	72579.5	82304.9	96018.4
3	4982.2	6788.3	7447.9	12773.3	15759.2	34362.1	57104.7	64531.6	75909.2
4	3386.6	4696.7	5171.3	8802.9	10867.6	23718.8	38684.4	44466.1	51773.6
5	2281.6	3117.8	3422.4	5859.4	7200.9	15558.1	25839.2	29510.0	34354.1
6+	10587.8	12414.7	13681.5	16560.7	21222.5	27227.1	33123.7	36475.8	42531.4

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2032

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7679.3	10615.6	11589.7	19955.7	24676.3	54253.8	89075.1	100862.3	117474.8
2	6533.3	8723.3	9709.2	16370.5	20155.7	44116.1	72731.5	82303.8	95925.0
3	4908.1	6817.3	7483.9	12808.5	15785.7	34649.1	56907.2	64532.6	75284.9
4	3433.1	4677.6	5132.1	8801.7	10859.2	23677.9	39349.2	44466.9	52306.8
5	2247.5	3116.9	3431.9	5842.0	7212.3	15741.0	25672.9	29510.0	34359.5
6+	10412.3	12351.6	13655.2	16535.4	21209.3	27136.4	32829.7	36378.3	42750.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2033

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7756.5	10656.8	11721.3	19973.0	24663.4	54079.2	90527.6	100863.2	117853.3
2	6266.2	8662.1	9457.0	16283.5	20135.5	44270.2	72683.9	82302.1	95857.6
3	5122.6	6839.7	7612.7	12835.6	15803.5	34590.0	57026.4	64531.7	75211.7
4	3382.1	4697.6	5156.9	8826.0	10877.5	23875.7	39213.2	44467.6	51876.7
5	2278.4	3104.3	3405.9	5841.3	7206.7	15713.9	26114.1	29510.5	34713.5
6+	10497.0	12395.7	13667.4	16539.5	21207.3	27081.7	32925.5	36559.5	43046.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2034

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7765.3	10578.3	11501.0	19944.8	24608.6	53807.0	88326.3	100860.8	117017.7
2	6329.2	8695.8	9564.4	16297.7	20125.0	44127.8	73869.1	82302.8	96166.5
3	4913.1	6791.7	7414.9	12767.4	15787.6	34710.8	56989.1	64530.4	75158.8
4	3529.8	4713.0	5245.7	8844.6	10889.7	23835.0	39295.3	44467.0	51826.3
5	2244.5	3117.6	3422.4	5857.4	7218.8	15845.1	26023.8	29510.9	34428.0
6+	10442.6	12474.7	13714.2	16564.6	21159.9	27226.8	33084.0	36618.0	42735.2

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2035

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7674.6	10657.2	11706.4	19993.8	24651.2	53475.3	89043.9	100859.2	118054.1
2	6336.3	8631.7	9384.7	16274.6	20080.2	43905.6	72072.9	82300.9	95484.6
3	4962.5	6818.1	7499.2	12778.5	15779.3	34599.2	57918.4	64530.9	75401.0
4	3385.5	4680.0	5109.4	8797.6	10878.8	23918.3	39269.6	44466.1	51789.8
5	2342.6	3127.8	3481.3	5869.7	7227.0	15818.1	26078.3	29510.5	34394.5
6+	10481.1	12360.3	13646.9	16539.1	21400.9	27425.2	33161.2	36794.8	42759.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2036

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7580.1	10640.0	11643.1	19949.8	24666.8	54063.9	88745.6	100855.3	116973.0
2	6262.4	8696.1	9552.2	16314.7	20115.0	43635.0	72658.4	82299.6	96330.3
3	4968.1	6767.8	7358.2	12760.4	15744.3	34425.0	56510.0	64529.4	74866.4
4	3419.5	4698.2	5167.5	8805.3	10873.1	23841.3	39909.9	44466.4	51956.7
5	2246.8	3105.9	3390.9	5838.6	7219.7	15873.4	26061.3	29509.9	34370.3
6+	10455.6	12453.9	13697.9	16688.7	21485.9	27431.4	33168.0	36730.2	42816.1

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2037

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7853.7	10664.8	11683.8	20028.2	24663.7	54453.8	89288.6	100859.7	117377.3
2	6185.2	8682.0	9500.6	16278.7	20127.7	44115.3	72415.1	82296.4	95448.2
3	4910.1	6818.3	7489.6	12791.8	15771.5	34212.8	56969.1	64528.4	75529.5
4	3423.4	4663.5	5070.3	8792.8	10848.9	23721.3	38939.5	44465.4	51588.3
5	2269.4	3117.9	3429.4	5843.6	7215.9	15822.3	26486.2	29510.2	34481.1
6+	10448.9	12430.3	13753.7	16666.3	21410.9	27423.2	33348.9	36621.0	43131.9

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2038

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7667.5	10627.8	11710.2	20004.8	24658.5	53929.0	89065.0	100863.2	117072.1
2	6408.5	8702.3	9533.8	16342.7	20125.2	44433.4	72858.1	82300.0	95778.1
3	4849.6	6807.3	7449.1	12763.6	15781.5	34589.4	56778.3	64525.9	74837.8
4	3383.4	4698.3	5160.9	8814.5	10867.7	23575.1	39255.8	44464.7	52045.2
5	2271.9	3095.0	3364.9	5835.4	7199.9	15742.6	25842.2	29509.5	34236.6
6+	10566.1	12474.3	13719.6	16692.6	21448.6	27377.6	33227.2	36673.0	43135.6

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2039

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7490.0	10588.5	11601.5	19920.8	24614.5	53743.3	89038.3	100864.5	117026.6
2	6256.6	8672.1	9555.3	16323.6	20120.9	44005.2	72675.6	82302.8	95529.0
3	5024.7	6823.2	7475.1	12813.8	15779.5	34838.8	57125.7	64528.7	75096.5

4	3341.8	4690.7	5133.0	8795.1	10874.6	23834.6	39124.3	44463.0	51568.6
5	2245.4	3118.0	3425.0	5849.7	7212.4	15645.6	26052.1	29509.0	34539.8
6+	10516.3	12464.4	13727.5	16677.9	21297.2	27489.3	33080.8	36380.3	43319.8

PERCENTILES OF POPULATION NUMBERS AT AGE VECTOR (000s FISH)
IN YEAR: 2040

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	7545.4	10647.5	11618.0	19987.2	24635.1	53042.0	87063.3	100860.7	117018.8
2	6111.7	8640.0	9466.6	16255.1	20085.0	43853.7	72653.8	82303.8	95491.9
3	4905.6	6799.5	7492.0	12798.8	15776.2	34503.1	56982.6	64530.9	74901.2
4	3462.4	4701.7	5150.9	8829.6	10873.2	24006.4	39363.7	44464.9	51746.9
5	2217.8	3113.0	3406.5	5836.8	7216.9	15817.8	25964.9	29507.9	34223.5
6+	10534.5	12496.5	13737.6	16580.6	21278.9	27335.1	33176.0	36748.6	42921.9

REALIZED F SERIES

YEAR	AVG F	STD
2011	0.684	0.157
2012	0.450	0.168
2013	0.210	0.000
2014	0.210	0.000
2015	0.210	0.000
2016	0.210	0.000
2017	0.210	0.000
2018	0.210	0.000
2019	0.210	0.000
2020	0.210	0.000
2021	0.210	0.000
2022	0.210	0.000
2023	0.210	0.000
2024	0.210	0.000
2025	0.210	0.000
2026	0.210	0.000
2027	0.210	0.000
2028	0.210	0.000
2029	0.210	0.000
2030	0.210	0.000
2031	0.210	0.000
2032	0.210	0.000
2033	0.210	0.000
2034	0.210	0.000
2035	0.210	0.000
2036	0.210	0.000
2037	0.210	0.000
2038	0.210	0.000
2039	0.210	0.000
2040	0.210	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2011	0.414	0.475	0.505	0.575	0.657	0.772	0.883	0.969	1.172
2012	0.219	0.259	0.286	0.341	0.407	0.514	0.659	0.780	1.029
2013	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2014	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2015	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2016	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2017	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210

2018	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2019	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2020	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2021	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2022	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2023	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2024	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2025	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2026	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2027	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2028	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2029	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2030	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2031	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2032	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2033	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2034	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2035	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2036	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2037	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2038	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2039	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2040	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.250

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2011	1.000
2012	0.966
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000

V-65

8.2.2 Finding of No Significant Impact (FONSI)

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

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

Response: The preferred alternatives cannot reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action. With respect to the target species in the Northeast Multispecies fishery the Preferred Alternatives adopt catch limits that are consistent with target fishing mortality rates that promote rebuilding and/or sustaining stock sizes.

(2) *Can the Preferred Alternatives reasonably be expected to jeopardize the sustainability of any non-target species?*

Response: For fishery resources that are caught incidental to groundfish fishing activity, there is no indication in the analyses that the alternatives will threaten sustainability. The Preferred Alternatives will result in relatively small changes in groundfish fishing effort and since the fishery does not currently jeopardize non-target species it is not likely that these alternatives will change that status.

(3) *Can the Preferred Alternatives 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?*

Response: The Preferred Alternatives cannot reasonably be expected to cause substantial damage to the oceans and coastal habitats and/or essential fish habitat. Analyses described in section 7.2 indicate that only minor impacts are expected.

(4) *Can the Preferred Alternatives be reasonably expected to have a substantial adverse impact on public health or safety?*

Response: Nothing in the Proposed Action can be reasonably expected to have a substantial adverse impact on public health or safety. Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near term future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

(5) *Can the Preferred Alternatives reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response: The Preferred Alternatives cannot be reasonably expected to adversely affect endangered or threatened species. For the reasons discussed in Sections 6.4, 7.6.5, and 8.3, the continued operation of the NE Multispecies FMP is not likely to jeopardize the continued existence of any Atlantic sturgeon DPS during the reinitiation period. This is due to the short time period encompassed by the reinitiation period, and consequently, the scale of any interactions with Atlantic sturgeon that may occur during this period. NMFS will implement any appropriate measures outlined in the Biological Opinion to mitigate harm to Atlantic sturgeon. Further, the encounter rates and mortalities for Atlantic sturgeon that have been calculated as part of the preliminary analysis of NEFOP data (as discussed in Sec 6.4.4) include encounters and mortalities by all fisheries utilizing large-mesh sink gillnet and otter trawl gear, including the spiny dogfish, and monkfish fisheries. Thus, it is likely that rates of encounters and mortalities by the groundfish fishery would be lower than those estimates. Therefore, impacts resulting from the approval of FW 47 are not likely to be significant.

(6) *Can the Preferred Alternatives 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.)?*

Response: The Preferred Alternatives are not expected to have a substantial impact on biodiversity and/or ecosystem function with the affected area. The use of ACLs will tightly control catches of target and incidental regulated groundfish stocks. Catches of target and incidental catch species under this program will be consistent with the mortality targets of Amendment 16, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH. It is therefore reasonable to expect that there will not be substantial impact on biodiversity or ecosystem function.

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

Response: The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternatives. The Preferred Alternatives are designed to implement specifications and modifications to continue the groundfish rebuilding programs that were implemented as a result of Amendments 13 and 16 to the Northeast Multispecies FMP. As described in Section 7.1, the action is expected to continue the rebuilding trajectories for most stocks that have been adopted. The action cannot be reasonably expected to have a substantial impact on habitat or protected species (see Sections 7.2 and 7.3), as the impacts are expected to fall within the range of those resulting from Amendment 16. The action's potential economic and social impacts are also addressed in the environmental assessment (see Sections 7.4 and 7.5, respectively) and more specifically in the Executive Order 12866 review (Section 8.11.1) and the Initial Regulatory Impact Review (Section 8.11).

NMFS has determined that despite the potential socio-economic impacts resulting from this action, there is no need to prepare an EIS. The purpose of NEPA is to protect the environment by requiring federal agencies to consider the impacts of their Proposed Action on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." This EA for Framework 47 describes and analyzes the proposed measures and alternatives and concludes there will be no significant impacts to the natural and physical environment. While some fishermen, shore-side businesses and others may experience impacts to their livelihood, these impacts in and of themselves do not require the preparation of an EIS, as supported by NEPA's implementing regulations at 40 C.F.R. 1508.14. Consequently, because the EA demonstrates that the action's potential natural and physical impacts are not significant, the execution of a FONSI remains appropriate under Criteria 7.

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

Response: The effects of the preferred measures on the quality of human environment are not expected to be highly controversial. The need to rebuild groundfish stocks is well-documented. While there has been some debate over how quickly to rebuild those stocks and the desired biomass for each stock, legal requirements established by the M-S Act render these discussions moot. These issues were also resolved with the adoption of Amendment 16, and with the exception of the GB yellowtail flounder rebuilding strategy this action does not modify those rebuilding plans. The effects of modifying the GB yellowtail flounder rebuilding schedule are not expected to be controversial since the proposed action was supported by industry and will allow catch on other stocks to be more fully optimized while staying within the boundaries of the M-S Act requirements.

(9) *Can the Preferred Alternatives 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?*

Response: No, the Preferred Alternatives cannot be reasonably expected to result in substantial impacts to unique areas or ecological critical areas. The only designated HAPC in the areas affected by this action is protected by an existing closed area that would not be affected by this action. In addition, vessel operations around the unique historical and cultural resources encompassed by the Stellwagen Bank National Marine Sanctuary would not likely be altered by this action. As a result, no substantial impacts are expected from this action.

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

Response: The Preferred Alternatives are not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The effort control measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks and initiated stock rebuilding. The administrative measures are relatively minor modifications that were anticipated by Amendment 16. While there is a degree of uncertainty over how fishermen will react to the proposed measures, the analytic tools used to evaluate the measures attempt to take that uncertainty into account and reflect the likely results as a range of possible outcomes. For example, the economic analysis in Section 7.4 illustrates the distribution of results that are expected rather then provide only a point estimate. Since ultimately the availability of a choice of whether to join a sector will serve to mitigate social and economic impacts, uncertainty over sector membership cannot be seen as a significant source of risk. Overall, the impacts of the Preferred Alternatives can be, and are, described with a relative amount of certainty.

(11) *Is the Preferred Alternative related to other actions with individually insignificant, but cumulatively significant impacts?*

Response: The Proposed Action is not related to other actions with individually insignificant but cumulatively significant impacts. Recent management actions in this fishery include FW 42, FW 43, Amendment 16, FW 44, FW 45, and FW 46. FW 42 developed specific measures implementing programs adopted by Amendment 13; each was determined to be insignificant. FW 43 adopted limits on groundfish bycatch by mid-water trawl herring vessels and was not determined to have a significant effect on either the groundfish or herring fisheries. Amendment

16 had significant impacts and thus required the preparation of an EIS, while Frameworks 44 and 46 set specifications as required under Amendment 16 and made relatively minor adjustments to the sector administration program. Framework 46 modified the amount of haddock that may be caught by the midwater herring fishery. The measures in this action were anticipated by Amendment 16 and thus cannot be said to have different cumulative impacts that were not foreseen and addressed in the amendment. Therefore, the Preferred Alternatives, when assessed in conjunction with the actions noted above, would not have significant impacts on the natural or physical environment.

(12) *Are the Preferred Alternatives likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources?*

<u>Response</u>: The Preferred Alternatives is not likely to affect objects listed in the National Register of Historic Places or cause significant impact to scientific, cultural, or historical resources. The only objects in the fishery area that are listed in the National Register of Historic Places are several wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternatives would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near wrecks to avoid tangling gear. Therefore, this action would not result in any adverse effects to wrecks.

(13) *Can the Preferred Alternatives reasonably be expected to result in the introduction or spread of a non-indigenous species?*

<u>Response:</u> This action would not result in the introduction or spread of any non-indigenous species, as it would not result in any vessel activity outside of the Northeast region.

(14) *Are the Preferred Alternatives likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

<u>Response:</u> No, the Preferred Alternatives are not likely to establish precedent for future actions with significant effects. The Preferred Alternatives adopts measures that are designed to react to the necessity to reduce fishing mortality for several groundfish stocks in order to achieve the fishing mortality targets adopted by Amendment 16 and Frameworks 44 and 45. As such, these measures are designed to address a specific problem and are not intended to represent a decision about future management actions that may adopt different measures.

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

<u>Response:</u> The Preferred Alternatives are intended to implement measures that would offer further protection of marine resources and would not threaten a violation of Federal, state, or local law or requirements to protect the environment.

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

<u>Response:</u> As specified in the responses to the first two criteria of this section, the Preferred Alternatives are not expected to result in cumulative adverse effects that would have a substantial

effect on target or non-target species. This action would maintain fishing mortality within M-S Act requirements for several groundfish stocks, with no expected increase in mortality for non-target and non-groundfish stocks.

FONSI STATEMENT: In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Framework Adjustment 47 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 47 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 required.

9 MAR 2012

Acting
Northeast Regional Administrator, NOAA — Date