Framework Adjustment 55
To the Northeast Multispecies FMP

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

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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. Amendment 16, which became effective on May 1, 2010, adopted 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. Amendment 18, which was submitted to NMFS on October 30, 2015, would addresses fleet diversity and accumulation limits. Since 2010, ten framework adjustments have updated the measures in the groundfish plan.

Amendment 16 made major changes to the FMP. The Amendment adopted a system of Annual Catch Limits (ACLs) and Accountability Measure (AMs) that are designed to ensure catches remain below desired targets for each stock in the management complex. The National Standard Guidelines provide advisory guidance (that does not have the effect or force of law) for the implementation of these requirements (50 CFR 600.310(g)). AMs are management controls to prevent ACLs from being exceeded and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overages in as short a time as possible. AMs can be either in season AMs or AMs for when the ACL is exceeded.

NMFS acknowledged in the publication of the guidelines that there is no requirement that AMs and ACLs be implemented as hard TACs or quotas, but conservation and management measures must be implemented so that the ACL is not exceeded and AMs must apply if the ACL is exceeded (74 FR 3184). While many measures in the management program are intended to control fishing mortality and might be interpreted to be AMs since they are “management controls to prevent the ACL from being exceeded,” the term AM is usually applied to specific, automatic measures that are implemented either as an ACL is approached or after an ACL is exceeded.

Framework 55 (FW55) is intended to incorporate status changes for groundfish stocks, set specifications for all groundfish stocks, update fishery program administration, and adjust management measures for commercial and recreational fisheries that catch groundfish stocks. This framework incorporates the results of new stock assessments into the setting of specifications, including catch limits for the U.S./Canada Resource Sharing Understanding and the distribution of ACLs to various components of the fishery. FW 55 would also implement an additional sector for operation in FY2016, change the process for approving new sectors, change the definition of the haddock separator trawl, and modify the sector at sea monitoring (ASM) program, the distribution of U.S. TACs for Eastern/Western Georges Bank cod, and the GOM cod protection measures.

The *need* for this action is to prevent overfishing, ensure rebuilding of overfished stocks, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006. Other needs for this action are to improve the enforcement of conservation gear, to provide additional flexibility within the sector system and recreational fishery in the face of changing regulations and legal circumstances. There are several *purposes* of FW55: to update changes to the status determination criteria, to adopt specifications, to adopt U.S./ Canada Total Allowable Catches (TACs), to implement new sectors, to modify the process of approving sectors, to change a net definition, to modify the at-sea monitoring program, to facilitate the transfer of ACE between management areas, and to modify the recreational component of the Gulf of Maine Cod protection measures.

Proposed Action
Under the provision of the M-S Act, the Council submits proposed management actions to the Secretary of Commerce for review. The Secretary of Commerce can approve, disapprove, or partially approve the action proposed by the Council. In the following alternative descriptions, measures identified as Preferred Alternatives constitute the Council's preferred management action.

If the Preferred Alternatives identified in this document are adopted, this action would implement a range of measures summarized in Section 4.0.

The Preferred Alternatives Include:

- *Stock status changes and Annual Catch Limits*
  - *Revised Status Determination for groundfish stocks.* The preferred alternative would revise status determination criteria consistent with the results of the peer reviewed assessments.
  - *Revised Annual Catch Limit Specifications.* The preferred alternative would adopt new Overfishing limits (OFLs), Acceptable Biological Catches (ABCs), and Annual Catch Limits for FY 2016 – FY 2018 for all groundfish stocks and FY2016 – FY2017 for GB yellowtail flounder would be as specified. Additionally, U.S./Canada TACs- would be specified for GB yellowtail flounder, Eastern GB cod and Eastern GB haddock. This alternative would also distribute the ABCs to the various components of the fishery. ACLs for state waters and other sub-components would be modified to reflect recent catches, and a sub-ACL for southern New England yellowtail flounder would be allocated to the Atlantic sea scallop fishery based on 90% of the scallop fishery's estimated catch.
- Fishery Program Administration
  - *Implementation of a new sector for FY 2016.* The preferred alternative would approve the formation of the Sustainable Harvest Sector II to commence on May 1, 2016, which would be comprised of active groundfish vessels.
  - *Revised process for approving new northeast groundfish sectors.* The preferred alternative would modify the process for approving new groundfish sectors, such that new sectors would not need to be approved through a Council action. The revised process would provide for Council discussion and comment on new sector applications, and NMFS would only approve a new sector upon the Council's endorsement.
  - *Revised definition of the haddock separator trawl.* The preferred alternative would revise the current definition of the haddock separator trawl by requiring that the horizontal large mesh separator panel must have mesh of a contrasting color to those sections of the net that it separates. All other net specifications would remain unchanged.
- Commercial and Recreational Fishery Measures
  - *Modification and adjustments to groundfish monitoring program.* The preferred alternatives modify the program in several ways. When applied in concert, the preferred

alternatives would result in a total observer coverage (NEFOP and ASM) rate of 14% in FY 2016.

- *Clarification of groundfish monitoring goals and objectives.* The preferred alternative would clarify that the primary goal of the groundfish sector ASM program is to verify area fished, catch, and discards by species, by gear type.

- *Clarification that ASM coverage levels be set only using realized stock level CVs.* The preferred alternative would clarify that the Council's intent that ASM coverage levels be set using only realized stock level CVs.

- *Application of a multi-year approach to setting sector ASM coverage rates.* The preferred alternative would specify that ASM coverage levels should be set using a three-year average of realized stock-level CVs.

- *Remove ASM coverage requirements for sector trips fishing extra-large mesh gear in Broad Stock Areas 2 & 4.* The preferred alternative would remove ASM coverage requirements for sector vessels fishing extra-large mesh gillnets of 10" or greater while on a sector trip fishing exclusively in Broad Stock Areas 2 or 4.

- *Adopt a fishery performance criteria predicting the target coverage level.* The preferred alternative would adopt a performance criteria for use in setting groundfish sector ASM coverage levels on an annual basis.

o *Distribution of U.S. TACs for Eastern/Western Georges Bank cod.* The preferred alternative would allow a sector or state-operated permit bank to convert its Eastern GB cod ACE to Western GB cod ACE.

o *Modify Gulf of Maine cod recreational possession limits.* The preferred alternative would allow the Regional Administrator (RA) to once again change the possession limit of GOM cod for the recreational fishery.

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 1.1; impacts on essential fish habitat are described in Section 7.2; impacts on endangered and other protected species are described in Section 7.3; the economic impacts are described in Section 7.4; and the social impacts are described in Section 7.5. Cumulative effects are described in Section 7.6. Summaries of the most significant impacts are provided in the following paragraphs. As required by NEPA, the Preferred Alternatives are compared to the No Action alternative and other alternatives. As No Action would result in little fishing effort, comparisons are also made between the Preferred Alternatives and status quo to enable a more realistic analysis of potential impacts, as appropriate.

Biological Impacts
The Preferred Alternatives are expected to result in negative impacts when compared to the No Action alternative. This is not informative, however, since No Action would adopt default specifications for the first three months of the FY for several stocks and the majority of groundfish fishing activity would be curtailed in the absence of new specifications. This scenario does not appear realistic as it would neither conform with the best available science nor provide the optimum yield (OY) for several stocks as required by the M-S Act. When compared with recent fishing activity and mortality, the preferred alternatives for

ACLs are expected to result in low positive impacts. The reduction in expected fishing effort is driven by the constraining nature of the ACL specifications for key stocks such as GOM cod, GB cod, GB winter flounder, SNE/MA yellowtail flounder, and witch flounder. Changes to fishery program administration would not be expected to have direct impacts, either positive or negative, on regulated groundfish and other species. With respect to the combined impact of the preferred ASM alternatives, biological impacts are expected to be low negative when compared to No Action because the uncertainty in discards may increase for some stocks which has the potential to impact stock assessments in the future. Further, observer bias could potentially increase with fewer observed trips. Allowing transfer of EGB cod to the western fishery would not be expected to lead to large increases in effort in other portions of the stock area, particularly with the proposed decline in GB cod quotas. The biological impacts of allowing the RA to once again change the possession limit of GOM cod for the recreational fishery is likely to vary, depending on whether or not the RA elects to increase the GOM cod bag limit from zero.

Essential Fish Habitat (EFH) Impacts

The Preferred Alternatives are expected to result in low negative habitat impacts when compared to the No Action alternative. This is not informative, however, since No Action would adopt default specifications for the first three months of the FY for several stocks and the majority of groundfish fishing activity would be curtailed in the absence of new specifications. When compared with recent fishing activity, the preferred alternatives are expected to result in a slight decrease in negative impacts. The reduction in expected fishing effort is driven by the constraining nature of the ACL specifications for key stocks such as GOM cod, GB cod, GB winter flounder, SNE/MA yellowtail flounder, and witch flounder. Changes to fishery program administration do not directly impact fishing effort, and thus would not be expected to have direct or indirect impacts, either positive or negative, on EFH. With respect to the combined impact of the preferred ASM alternative, no direct impacts to EFH are expected, as overall effort is constrained by declining sub-ACLs for several stocks, particularly GOM and GB cod. Allowing transfer of EGB cod to the western fishery would not be expected to lead to large increases in effort in other portions of the stock area, particularly with the proposed decline in GB cod quotas.

Impacts on Endangered and Other Protected Species

When compared to recent fishing activity, the preferred alternatives would likely lead to negligible to low negative impacts on protected species. The ABCs and ACLs specified in the preferred alternative are not expected to result in an increase in fishing effort or shifts in fishing effort to areas that have not been considered by NMFS in its assessment of fishery effects to protected resources. The combination of preferred monitoring options would likely to result in lower overall ASM coverage levels for the sector fleet, and would likely have a low negative impact on protected species, potentially increasing uncertainty in bycatch estimates for some protected resources. Allowing transfer of EGB cod to the western fishery would be expected to have neutral impacts on protected species because it is not expected to lead to large changes in effort in other portions of the stock area, particularly with the proposed decline in GB cod quotas.

Economic Impacts

The Preferred Alternatives would likely result in an increase in groundfish fishing vessel revenues when compared to No Action for ACLs. This is not informative, however, since No Action would adopt default specifications for the first three months of the FY for several stocks and the majority of groundfish fishing activity would be curtailed in the absence of new specifications. The preferred alternatives would be expected to result in $68.8 million in gross groundfish revenues for FY2016. This represents approximately a $7.5 million dollar reduction in predicted revenue from FY 2015, and a $12.5 million dollar reduction in predicted groundfish revenue for FY2014. The economic impacts of the preferred alternatives are not expected to be uniformly distributed across vessel size class and port. The implementation of an additional sector and the modification of the sector approval process would likely result in positive economic impacts for the fishery because it would provide greater flexibility for sectors.

The combination of preferred ASM alternatives would likely result in up to 14% ASM coverage rate for sector vessels, and a reduction in costs for sectors relative to the No Action (41% coverage). Allowing the transfer of eastern Georges Bank cod to the western fishery is expected to add operational flexibility for sectors and permit banks, and yield positive economic impacts. Allowing the RA to once again change the possession limit of GOM cod for the recreational fishery is likely to vary, depending on whether or not the RA elects to increase the GOM cod bag limit from zero.

Social Impacts

The social impacts of the Preferred Alternatives for annual catch limit specifications would be positive relative to the No Action, but largely negative relative to the fishery compared to FY 2015. Changes to fishery program administration in FW55 are expected to be positive because they would provide greater flexibility for the groundfish fishery. The preferred ASM measures would result in lower coverage levels for sectors relative to No Action, resulting in lower costs and positive impacts relative to the *Size and Demographics* and *Attitudes, Beliefs, and Values* of the groundfish fishery. Modifications to the distribution of U.S. TACs for Eastern/Western Georges Bank may have positive impacts on the *Historical Dependence on and Participation in* the fishery by increasing the flexibility of fishing operations. Similar to other VECs, the allowing the RA to once again change the possession limit of GOM cod for the recreational fishery would add flexibility to process to setting recreational measures, but may not result in an increase in bag limit of GOM cod from zero.

Alternatives to the Proposed Action

There are a number of alternatives analyzed in the document that are not identified as preferred alternatives. These include some of the No Action alternatives in sections 4.1 (Updates to Status Criteria, Formal Rebuilding Programs and Annual Catch Limits), 4.2 (Fishery Program Administration), and 4.3 (Commercial and Recreational Fishery Measures), as well as alternatives for GOM cod spawning protection areas and zero possession of GOM cod, which were not identified as preferred alternatives. These alternatives are briefly described below.

- *Stock Status Changes and Annual Catch Limits*
    - *Revised status determination criteria for groundfish stocks.* The No Action would not update the status determination criteria (SDC) or the numerical estimates for the SDC. Using the old criteria would not be consistent with recently completed assessments and would not comply with M-S Act requirements to use best available science.
    - *Revised Annual Catch Limit Specifications.* The No Action would not adopt new specifications for the majority of groundfish stocks. Default specifications, set at 35% of the prior year's ACL, would remain in place through July 31st, 2016. In addition, FY 2016 quotas would not be specified for GB yellowtail flounder, EGB cod, EGB haddock, which are managed through the U.S./Canada Resource Sharing Understanding. A SNE/MA yellowtail flounder sub-ACL would not be allocated to the scallop fishery.
- Fishery Program Administration
    - *Implementation of a new sector for FY 2016.* The No Action alternative would not approve the formation of the Sustainable Harvest Sector II. The number of approved sector would remain at 24.
    - *Revised process for approving new northeast groundfish sectors.* The process for creating a new sector, as described in Amendment 16, would not change. Under current

regulations, an appropriate NEPA document must be prepared by a potential new sector and submitted to NMFS through the Council in an action that assesses the impacts of forming the sector.

- *Revised definition of the haddock separator trawl.* The No Action would not change the current definition of the haddock separator trawl at 50 CFR 648.85(a)(3)(iii)(A). Under the current definition, there is no requirement that the separator panel have meshes of a contrasting color.

- Commercial and Recreational Fishery Measures
  - *Modification and adjustments to groundfish monitoring program.* The No Action would maintain the groundfish monitoring program as defined in Amendment 16 and Framework 48. There would be no changes to the goals, objectives, standards for monitoring the fishery, or industry responsibility for funding a portion of the ASM program. The No Action alternative would also maintain lower ASM coverage rates for sector trips on a Monkfish DAS in the SNE Broad Stock Area using 10” ELM gillnet gear. There would be no changes or clarification to the methods used by NMFS to set ASM coverage rates for groundfish sectors on an annual basis.
  - *Distribution of U.S. TACs for Eastern/Western Georges Bank cod.* The No Action would continue the practice of only allowing Eastern GB cod ACE to be harvested in the Eastern U.S./Canada area. After deducting the U.S./Canada TAC from the U.S. ABC, the remaining portion of the GB cod ABC would be available to the western fishery.
  - *Modify Gulf of Maine cod recreational possession limits.* The No Action would prohibit possession of GOM cod for the recreational fishery.

Impacts of Alternatives to the Proposed Action

In many cases, the No Action alternative would not address the goals of the M-S Act. Only the most significant impacts are highlighted below.

Biological Impacts
Because the No Action alternatives would adopt default specifications for several stocks, and would not modify the SDC based on best available science, it would lead to a drastic reduction in groundfish fishing activity. With no changes to the ASM program, the biological impacts would continue to be positive with respect to information for stock assessments and reducing the uncertainty in discard estimation. Because of the drastic reduction in groundfish fishing activity, this option would be expected to result in reduced fishing mortality rates and faster stock rebuilding than the Preferred Alternatives.

Essential Fish Habitat
Because the No Action alternatives would adopt default specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a drastic reduction in groundfish fishing activity over the course of the fishing year. With no changes to the ASM program, the EFH impacts would continue to be positive with respect to potentially reducing fishing effort. The alternatives to the proposed action would be expected to result in reduced habitat impacts because they could result in lower fishing effort than the Preferred Alternatives.

Impacts on Endangered and Other Protected Species

Because the No Action alternatives would adopt default specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a drastic reduction in groundfish fishing activity over the course of the fishing year. With no changes to the ASM program, the protected species impacts would continue to be positive with respect to reducing uncertainty in bycatch estimates. The alternatives to the proposed action, in general, would be expected to result in reduced fishing effort and thus reduced fishing impacts on endangered and other protected species.

Economic Impacts
Because the No Action alternatives would adopt default specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a drastic reduction in groundfish fishing activity. With no changes to the ASM program, the economic impacts would be negative with respect to increased costs combined with low ACLs. As a result, fishing vessel revenues on groundfish fishing trips would decline dramatically when compared to the preferred alternative or recent fishing years.

Social Impacts
Because the No Action alternatives would adopt default specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a drastic reduction in groundfish fishing activity and reduced groundfish fishing revenues. The No Action alternative will likely have negative impacts on the *Size and Demographic Characteristics* of the fishery and *Attitudes, Beliefs, and Values.*. Overall, this would likely lead to dramatic changes in the size and demographics of the groundfish fishery, dissatisfaction with the fishing industry and management, and a negative impact on fishermen's attitudes and beliefs.

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Appendix I: SSC Recommendation for Northeast Multispecies ABCs, FY 2015 – FY 2017
Appendix II: Calculation of Northeast Multispecies Annual Catch Limits, FY 2016 – FY 2018
Appendix III: ABC Projection Output

2.5 List of Acronyms

ABC	Acceptable Biological Catch
ACE	Annual Catch Entitlement
ACL	Annual Catch Limit
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
APA	Administrative Procedures Act
ASAP	Age-structured assessment program; assessment model
ASM	At-sea monitoring
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
CAA	Catch at Age
CATT	Closed Area Technical Team- a team established by the Council to look at spatial based management on spawning fish
CAI	Closed Area I
CAII	Closed Area II
CC	Cape Cod
CEQ	Council on Environmental Quality
CPUE	Catch per unit of effort
CV	Coefficient of Variation
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
ELM	Extra-large mesh
EM	Electronic monitoring
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
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
GEA	Gear Effects Evaluation
GIFA	Governing International Fisheries Agreement
GIS	Geographic Information System
GARFO	Greater Atlantic Regional Fisheries Office
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
LISA	Local Indicator of Spatial Association
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
NEFOP	Northeast Fishery Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
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
OA2	Omnibus Essential Fish Habitat Amendment 2
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
QCM	Quota change model
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
SASI	Swept Area Seabed Impact
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	Weigh-out
YPR	Yield per recruit

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. Eight framework adjustments have updated the measures in Amendment 16.

Amendment 16 made major changes to the FMP. The Amendment adopted a system of Annual Catch Limits (ACLs) and Accountability Measure (AMs) that are designed to ensure catches remain below desired targets for each stock in the management complex. The National Standard Guidelines provide advisory guidance (that does not have the effect or force of law) for the implementation of these requirements (50CFR 600.310(g)). AMs are management controls to prevent ACLs from being exceeded and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overages in as short a time as possible. AMs can be either in season AMs or AMs for when the ACL is exceeded.

NMFS acknowledged in the publication of the guidelines that there is no requirement that AMs and ACLs be implemented as hard TACs or quotas, but conservation and management measures must be implemented so that the ACL is not exceeded and AMs must apply if the ACL is exceeded (74 FR 3184). While many measures in the management program are intended to control fishing mortality and might be interpreted to be AMs since they are "management controls to prevent the ACL from being exceeded," the term AM is usually applied to specific, automatic measures that are implemented either as an ACL is approached or after an ACL is exceeded.

This framework (Framework Adjustment 55, FW55) is intended to incorporate any status changes for groundfish stocks, set specifications for several groundfish stocks, and adjust management measures for commercial and recreational fisheries that catch groundfish stocks.

3.2 Purpose and Need for the Action

Periodic frameworks are used to adjust strategies in response to the evaluations that adjust rebuilding plans and overfishing. This framework (FW55) is intended to incorporate any status changes for groundfish stocks, set specifications for several groundfish stocks, modify fishery program administration, and adjust management measures for commercial and recreational fisheries that catch groundfish stocks. The need for this action is to meet regulatory requirements and adjust management measures that are necessary to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006, and to provide additional flexibility within the sector system in the face of changing regulations.

There are several *purposes* of FW55: to update changes to the status determination criteria, to adopt specifications, to adopt U.S./ Canada Total Allowable Catches (TACs), to implement new sectors, to modify the process of approving sectors, to change a net definition, to modify the at-sea monitoring program, to facilitate the transfer of ACE between management areas, and to modify the recreational component of the Gulf of Maine Cod Protection measures.

The measures analyzed in this EA are intended to meet the goals 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, Table 1 summarizes the need for the action and corresponding purposes.

Table 1 - Purpose and Need for Framework 55

Need for Framework 55	*Corresponding Purpose for Framework 55*
Ensure that stock are managed consistent with the status of stocks, the National Standard guidelines, and the requirements of the MSA	Measure to update status determination criteria
Ensure that levels of catch for Fishing Years 2016-2018 are 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	Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs Measure to adopt TACs for U.S./Canada area
Ensure that overfishing does not occur consistent with the status of stocks, and the requirements of MSA of 2006 Improve the enforcement of conservation gear Provide additional flexibility within the sector system and recreational fishery in the face of changing regulations and legal circumstances.	Modify the at-sea monitoring program for sectors Measures to implement new sectors and modify the process for approving new sectors Measure to modify the definition of the haddock separator trawl Measure to facilitate the transfer of ACE between management areas Measure to modify the recreational component of the Gulf of Maine Cod Protection measures

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 terminated in 1982 with the adoption of the Interim Groundfish Plan, which used 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. A detailed discussion of the history of the FMP up to 2009 can be found in Amendment 16 (NEFMC 2009b).

Amendment 16 was adopted in 2009 and had major changes to the FMP. It greatly expanded the sector program and implemented Annual Catch Limits in compliance with 2006 revisions to the M-S Act. There were a host of mortality reduction measures for “common pool” (i.e. non-sector) vessels and the recreational component of the fishery. An appeal of the lawsuit filed by the Cities of Gloucester and New Bedford and several East Coast fishing industry members against Amendment 16 was heard by the U.S. Court of Appeals for the First Circuit in Boston in September, 2012. The court ruled against the plaintiffs and the provisions of Amendment 16 were upheld. 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.

There have been several approved Council actions since the adoption of 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. Framework 46 revised the allocation of haddock to be caught by the herring fishery and was implemented in August 2011. Amendment 17 authorizes NOAA-sponsored state-operated permit banks and was implemented on April 23, 2012. Framework 47, implemented on May 1, 2012, set specifications for some groundfish stocks for FY 2012 – 2014, modified AMs for the groundfish fishery and the administration of the scallop fishery AMs, and revised common pool management measures; modification of the Ruhle trawl definition and clarification of regulations for charter/party and recreational groundfish vessels fishing in groundfish closed areas were proposed under the RA authority. Framework 48 was partially approved for May 1, 2013 some measures are still in review. That action proposes revised status determination criteria for several stocks, modifies the sub-ACL system, adjusts monitoring measures for the groundfish fishery, and changes several accountability measures (AMs). Framework 50 was also implemented on May 1, 2013, and set specifications for many groundfish stocks and modified the rebuilding program for SNE/MA winter flounder. Framework 49 is a joint Northeast Multispecies/Atlantic Sea Scallop action that modified the dates for scallop vessel access to the year-round groundfish closed areas; this action was implemented on May 20, 2013. Framework 51 modified rebuilding programs for GOM cod and American plaice, set specifications for FY2014-2016 and modified management measures in order to ensure that overfishing does not occur including, additional management measures related to U.S./Canada shared stocks and yellowtail flounder in the groundfish and scallop fisheries. Framework Adjustment 52 was approved on January 15, 2015. This action made two revisions to the accountability measures (AMs) for the groundfish fishery for the northern (GOM/GB) and southern (SNE/MA) windowpane flounder stocks. Framework 53 was implemented on May 1, 2015. This action updated changes to the status determination criteria, set specifications for FY2015-2017, adopted U.S./ Canada Total Allowable Catches (TACs), established management measures for GOM cod that revise rolling closures and possession limits to enable GOM cod protection while providing opportunity for the groundfish fishery to prosecute healthy stocks in other times and areas, implemented default specifications, and to revised regulations governing Sector Annual Catch Entitlement (ACE) carryover. Amendment 18 which would address fleet diversity and accumulation limits, was submitted to NMFS on October 30, 2015. Monkfish FW 9 is a joint action with the groundfish plan (FW 54), and would modify regulations for vessels in the DAS program.

The final documents for all prior 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 includes the required NEPA analyses.

3.5 Fishery Data Sources

This document includes fishery data from FY2009 to FY2014 and in some instances partial FY 2015 data. This approach informs the analysis and provides a baseline for the public to better understand the operation of the fishery. Some differences in totals between this analysis and prior analyses exist.

A “groundfish trip” is defined here as a trip where groundfish is landed, and either applied to a sector Annual Catch Entitlement (ACE) or to the common pool ACL. Unless stated otherwise, NMFS compiled most of the gear and/or location-specific data presented here from VTRs, because it contains effort, gear, and positional data. Some of the data in this document, such as that concerning protected resources, is from the Northeast Fisheries Observer Program data set.

4.0 ALTERNATIVES UNDER CONSIDERATION

4.1 Updates to Status Determination Criteria, and Annual Catch Limits

4.1.1 Revised Status Determination Criteria

4.1.1.1 Option 1: No Action

No Action. There would be no revisions to the status determination criteria (SDC) of groundfish stocks, and numerical estimates would not change (Table 2 and Table 3).

Table 2 - No Action status determination criteria.

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Georges Bank Cod	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Gulf of Maine Cod	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Haddock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Gulf of Maine Haddock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Yellowtail Flounder	Unknown	Unknown	Unknown
Southern New England/Mid-Atlantic Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Cape Cod/Gulf of Maine Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
American Plaice	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Witch Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}
Gulf of Maine Winter Flounder	Unknown	Unknown	F40% MSP
Southern New England/Mid-Atlantic Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}
Acadian Redfish	SSB_{MSY}: SSB/R (50% MSP)	½ Btarget	F50% MSP
White Hake	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Pollock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Northern Windowpane Flounder	External	½ Btarget	Rel F at replacement
Southern Windowpane Flounder	External	½ Btarget	Rel F at replacement
Ocean Pout	External	½ Btarget	Rel F at replacement
Atlantic Halibut[1]	Internal	½ Btarget	$F_{0.1}$
Atlantic Wolffish	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP

Table 3 - No Action numerical estimates of SDCs.

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Georges Bank Cod	ASAP	186,535	0.177	30,622
Gulf of Maine Cod	ASAP M=0.2	47,184	0.18	7,753
	ASAP M-ramp	69,621	0.18	11,388
Georges Bank Haddock	VPA	124,900	0.39	28,000
Gulf of Maine Haddock	ASAP	4,108	0.46	955
Georges Bank Yellowtail Flounder	empirical	NA	NA	NA
Southern New England/Mid-Atlantic Yellowtail Flounder	ASAP	2,995	0.32	773
Cape Cod/Gulf of Maine Yellowtail Flounder	VPA	7,080	0.259	1,600
American Plaice	VPA	18,398	0.179	3,385
Witch Flounder	VPA	10,051	0.27	2,075
Georges Bank Winter Flounder	VPA	8,100	0.44	3,200
Gulf of Maine Winter Flounder	empirical	NA	0.23 (exploitation rate)	NA
Southern New England/Mid-Atlantic Winter Flounder	ASAP	43,661	0.29	11,728
Acadian Redfish	ASAP	238,480	0.038	8,891
White Hake	ASAP	32,400	0.20	5,630
Pollock	ASAP	76,879	0.273	14,791
Northern Windowpane Flounder	AIM	1.60 kg/tow	0.44 c/i	700
Southern Windowpane Flounder	AIM	0.24 kg/tow	2.088 c/i	500
Ocean Pout	index	4.94 kg/tow	0.76 c/i	3,754
Atlantic Halibut	RYM	48,509	0.073	3,546
Atlantic Wolffish	SCALE	1,756	0.334	261

4.1.1.2 Option 2: Revised Status Determination Criteria (*Preferred Alternative*)

This option updates the numerical estimates of the status determination criteria for all groundfish stocks (Table 4). 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. The NEFSC conducted assessment for all groundfish stocks in 2015. The peer review recommended updated numerical values are provided in Table 5, for information purposes only. Option 2 would also adopt revised status determination criteria for GB cod and Atlantic halibut (Table 4). The peer review concluded that the GB cod and Atlantic halibut models were not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based an alternative approach. In the case of GB cod, the update to the ASAP model was rejected, not the underlying benchmark formulation from SAW 55. Because a stock assessment model framework is lacking for Atlantic halibut, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is therefore not possible. The panel recommended that for GB cod that the SAW 55 assessment is the best scientific information for determining overfishing definitions. The panel concluded for Atlantic halibut that, based on the long-term exploitation history and survey trends, the stock is still overfished. Based on this information, the No Action SDC definitions for GB cod and Atlantic halibut are retained in Option 2.

Rationale: This option would update the status determination criteria for all groundfish stocks to reflect the best scientific information. This option reflects recent assessment results.

Table 4 - Option 2 status determination criteria

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Georges Bank Cod*	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Gulf of Maine Cod	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Haddock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Gulf of Maine Haddock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Yellowtail Flounder	Unknown	Unknown	Unknown
Southern New England/Mid-Atlantic Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Cape Cod/Gulf of Maine Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
American Plaice	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Witch Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Georges Bank Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}
Gulf of Maine Winter Flounder	Unknown	Unknown	F40% MSP
Southern New England/Mid-Atlantic Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}
Acadian Redfish	SSB_{MSY}: SSB/R (50% MSP)	½ Btarget	F50% MSP
White Hake	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Pollock	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Northern Windowpane Flounder	External	½ Btarget	Rel F at replacement
Southern Windowpane Flounder	External	½ Btarget	Rel F at replacement
Ocean Pout	External	½ Btarget	Rel F at replacement
Atlantic Halibut*	Internal	½ Btarget	$F_{0.1}$
Atlantic Wolffish	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP

*The 2015 GB cod and Atlantic halibut operational assessments were rejected by the peer review panel. The update to the GB cod ASAP model was rejected, not the benchmark formulation from SAW 55. While the peer review concluded that overfishing status of GB cod and Atlantic halibut is considered unknown, the review panel determined that the stocks remains overfished based on other approaches. The panel recommended that for GB cod that the SAW 55 assessment is the best scientific information for determining overfishing definitions. The panel concluded for Atlantic halibut that, based on the long-term exploitation history and survey trends, the stock is still overfished. Based on this information, the No Action SDC definitions for GB cod and Atlantic halibut are retained in Option 2.

Table 5 - Option 2 current numerical estimates of SDCs (provided for informational purposes only).

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Georges Bank Cod*	ASAP	186,535	0.177	30,622
Gulf of Maine Cod	ASAP M=0.2	40,187	0.185	6,797
	ASAP M-ramp	59,045	0.187	10,043
Georges Bank Haddock	VPA	108,300	0.39	24,900
Gulf of Maine Haddock	ASAP	4,623	0.468	1,083
Georges Bank Yellowtail Flounder	empirical	NA	NA	NA
Southern New England/Mid-Atlantic Yellowtail Flounder	ASAP	1,959	0.35	541
Cape Cod/Gulf of Maine Yellowtail Flounder	VPA	5,259	0.279	1,285
American Plaice	VPA	13,107	0.196	2,675
Witch Flounder	VPA	9,473	0.279	1,957
Georges Bank Winter Flounder	VPA	6,700	0.536	2,840
Gulf of Maine Winter Flounder	empirical	NA	0.23 (exploitation rate)	NA
Southern New England/Mid-Atlantic Winter Flounder	ASAP	26,928	0.325	7,831
Acadian Redfish	ASAP	281,112	0.038	10,466
White Hake	ASAP	32,550	0.188	5,422
Pollock	ASAP	105,226	0.277	19,678
Northern Windowpane Flounder	AIM	1.554 kg/tow	0.45 c/i	700
Southern Windowpane Flounder	AIM	0.247 kg/tow	2.027 c/i	500
Ocean Pout	index	4.94 kg/tow	0.76 c/i	3,754
Atlantic Halibut*	NA	NA	NA	NA
Atlantic Wolffish	SCALE	1,663	0.243	244

* The panel recommended that for GB cod that the SAW 55 assessment is the best scientific information for determining overfishing definitions. For GB cod, this table includes the SAW 55 numerical estimates, as in the No Action. The panel concluded for Atlantic halibut that based on the long-term exploitation history and survey trends that the stock is still overfished. Since the Atlantic halibut model was rejected by the peer review and an alternative approach adopted to status determination, numerical estimates of SDCs are not available.

4.1.2 Annual Catch Limits

4.1.2.1 Option 1: No Action

No Action. There would be no changes to the specifications for FY 2016 – FY 2017 that were adopted by FW53 final rule (Table 7). Default specifications, set at 35% of the FY2015 catch limits, would remain in place for all other stocks and expire on July 31st, 2016 or when replaced by new specifications (Table 6). The directed groundfish fishery would be expected to operate in all BSAs through July 31, 2016. A scallop fishery sub-ACL for SNE/MA yellowtail flounder would not be specified. There would be no FY 2016 quotas specified for the transboundary Georges Bank stocks (i.e. GB cod, GB haddock, GB yellowtail flounder), which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

Rationale: The No Action alternative uses the default ABCs/ACLs adopted in FW 53. These values are based on the earlier assessments, and not the 2015 Operational Update. Default ABCs only extend for three (3) months and would not allow fishing the entire fishing year.

Table 6 - FY2016 Default Specifications compared to the SSC's recommended FY 2016 ABC's (mt).

	FY2016 Default Specifications						FY2016 - U.S. ABC
	U.S. ABC	Total ACL	Groundfish Sub-ACL	Sector Sub-ACL	Common pool sub-ACL	Midwater trawl fishery	
GB Cod	693	660	625	612	13	....	762
GB Haddock	8,528	8,121	7,616	7,548	68	79	56,068
SNE/MA Yellowtail Flounder	245	232	195	155	40	....	267
CC/GOM Yellowtail Flounder	192	184	161	153	8	....	427
American Plaice	540	514	492	483	9	....	1,297
Witch Flounder	274	263	213	208	5	....	460
SNE/MA Winter Flounder	587	563	457	402	56	....	780
Redfish	4,191	3,988	3,862	3,840	22	....	10,338
N. Windowpane Flounder	53	50	35	na	35	....	182
S. Windowpane Flounder	192	184	36	na	36	....	623
Ocean Pout	82	77	68	na	68	....	165
Atlantic Halibut	35	34	22	na	22	....	124
Atlantic Wolffish	25	23	22	na	22	....	82

Table 7 - No Action/Option 1 Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2016 (metric tons, live weight). Values are rounded to the nearest metric ton. Default specifications for FY 2016 are shown in italics, and remain in place through July 31st, 2016.

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2016		*693*				*625*			*612*	*13*		*660*
	2017												
	2018												
GOM Cod	2016	514	386	26	13		328		121	201	6		366
	2017	514	386	26	13		328		121	201	6		366
	2018												
GB Haddock	2016		*8,528*				*7,616*	*7,616*		*7,548*	*68*	*79*	*8,121*
	2017												
	2018												
GOM Haddock	2016	2,270	1,772	13	26		1,620		453	1,155	12	16	1,675
	2017	2,707	2,125	26	31		1,943		543	1,386	14	20	2,009
	2018												
GB Yellowtail Flounder	2016		354		4	55				274	4	7	343
	2017												
	2018												
SNE/MA Yellowtail Flounder	2016		*245*				*195*			*155*	*40*		*232*
	2017												
	2018												
CC/GOM Yellowtail Flounder	2016		*192*				*161*			*153*	*8*		*184*
	2017												
	2018												

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
American Plaice	2016		*540*				*492*			*483*	*9*		*514*
	2017												
	2018												
Witch Flounder	2016		*274*				*213*			*208*	*5*		*263*
	2017												
	2018												
GB Winter Flounder	2016	3,383	2,107		63		1,982			1,967	19		2,046
	2017	3,511	2,180		65		2,051			2,035	20		2,117
	2018												
GOM Winter Flounder	2016	688	510	87	10		392			371	21		489
	2017	688	510	87	10		392			371	21		489
	2018												
SNE/MA Winter Flounder	2016		587				457			402	56		563
	2017												
	2018												
Redfish	2016		*4,191*				*3,862*			*3,840*	*22*		*3,988*
	2017												
	2018												
White Hake	2016	6,314	4,645	46	93		4,280			4,250	30		4,420
	2017												
	2018												
Pollock	2016	21,864	16,600	996	1,162		13,720			13,628	92		15,878
	2017	24,598	16,600	996	1,162		13,720			13,628	92		15,878
	2018												

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GOM/GB Windowpane Flounder	2016 2017 2018		*53*				*35*				*35*		*50*
SNE/MA Windowpane Flounder	2016 2017 2018		*192*				*184*				*36*		*184*
Ocean Pout	2016 2017 2018		*82*				*77*				*68*		*77*
Atlantic Halibut	2016 2017 2018		*35*				*34*				*22*		*34*
Atlantic Wolffish	2016 2017 2018		*25*				*23*				*22*		*23*

4.1.2.2 Option 2: Revised Annual Catch Limit Specifications (*Preferred Alternative, with Options 1A and 2B*)

Under Option 2, the annual specification for FY 2016 – FY 2018 for all groundfish stocks and FY2016 – FY2017 for GB yellowtail flounder would be as specified in Table 10. Option 2 includes adjustments to the state waters and other sub-component values from those specified in FW 53 under the No Action (see Appendix III for additional information). Table 11 provides the Closed Area I Hook Gear Haddock SAP.

The Council considered multiple SNE/MA yellowtail flounder sub-ACLs for the scallop fishery (Sub-options 1a and 1b), and multiple ABCs for witch flounder (Sub-options 2a, 2b, and 2c).

U.S./ Canada TACs

This alternative would specify TACs for the U.S./Canada Management Area for FY 2016 as indicated in Table 8. If NMFS determines that FY 2015 catch of GB cod, haddock, or yellowtail flounder from the U.S./Canada Management Area exceeded the respective 2015 TAC, the U.S./Canada Resource Sharing Understanding and the regulations require that the 2016 TAC be reduced by the amount of the overage. Any overage reduction would be applied to the components of the fishery that caused the overage of the U.S. TAC in 2015. 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.

In addition under Option 2, a 2017 target TAC of 50,000 mt for EGB haddock is identified to be used as an upper bound with determining 2017 catch advice (Table 10). This number is expected to be reviewed in 2016 by the Transboundary Management Guidance Committee (TMGC).

A comparison of the proposed FY 2016 U.S. TACs and the FY 2015 U.S. TACs is shown in Table 9. Changes to the U.S. TACs reflect changes to the percentage shares, stock status, and the TMGC recommendations.

Table 8 - Proposed FY2016 U.S./Canada TACs (mt).

	Eastern GB Cod	**Eastern GB Haddock**	**GB Yellowtail Flounder**
Total Shared TAC	625	37,000	354 (*Total ABC)*
U.S. TAC	138	15,170	269 (*US ABC*)
Canada TAC	487	21,830	85

Table 9 - Comparison of the Proposed FY 2016 U.S. TACs and the FY 2015 U.S. TACs (mt).

Stock	U.S. TAC		Percent Change
	FY 2016	FY 2015	
Eastern GB cod	138	124	*+11.3%*
Eastern GB haddock	15,170	17,760	*-14.6%*
GB yellowtail flounder	269	248	*+8.5%*

Rationale: This measure would adopt new specifications for groundfish management units that are consistent with the most recent assessment information. For moststocks except witch flounder and SNE/MA yellowtail flounder, only one alternative to No Action is shown. This is because the values in Option 2 represent the best scientific information, as determined by the Council's Scientific and Statistical Committee, and the M-S Act requires that catches not be set higher than these levels. Any catches below these levels would not mitigate economic impact on fishing communities. This measure would also adjust state waters and other sub-component ACLs to reflect recent sub-component performance. Rationale for ABCs set during the 2015 Operational Assessments can be found in the SSC's report to the Council in Appendix I.

The U.S. and Canada coordinate management of three management units that overlap the boundary between the two countries on Georges Bank. Agreement on the amount to be caught is reached each year by the TMGC. This framework includes the recommendations of the TMGC, which are consistent with the most recent TRAC assessments.

Table 10 - Option 2 Revised OFLs, ABC, and ACLs. Stocks which are underlined would be subject to adjustments in 2017 & 2018 based on US/CA quotas. SNE/MA scallop sub-ACLs are based on the highest estimated bycatch (high, 100%), and 90% of the lowest bycatch estimate (low, 90%) of all FW27 alternatives.

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2016	1,665	762	23	99		608	608		595	13		730
	2017	1,665	1,249	37	162		997	997		975	22		1,197
	2018	1,665	1,249	37	162		997	997		975	22		1,197
GOM Cod	2016	667	500	27	10		437	280	157	273	8		473
	2017	667	500	27	10		437	280	157	273	8		473
	2018	667	500	27	10		437	280	157	273	8		473
GB Haddock	2016	160,385	56,068	561	561		51,667	51,667		51,209	458	521	53,309
	2017	258,691	48,398	484	484		44,599	44,599		44,204	395	450	46,017
	2018	358,077	77,898	779	779		71,783	44,599		71,147	636	724	74,065
GOM Haddock	2016	4,717	3,630	26	26		3,344	2,416	928	2,385	31	34	3,430
	2017	5,873	4,534	33	33		4,177	3,017	1,160	2,979	39	42	4,285
	2018	6,218	4,815	35	35		4,436	3,204	1,231	3,163	41	45	4,550
GB Yellowtail Flounder	2016		269		3	42	211	211		207	4	5	261
	2017		354		4	55	278	278		273	5	7	343
	2018												
SNE/MA Yellowtail Flounder (90%)	2016		267	5	29	32	189	189		150	39		255
	2017		267	5	29	34	187	187		149	39		255
	2018		267	5	29	37	186	186		148	38		255
SNE/MA Yellowtail Flounder (100%)	2016		267	5	29	36	184	184		146	38		255
	2017		267	5	29	38	182	182		145	37		255
	2018		267	5	29	41	179	179		142	37		255

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
CC/GOM	2016	555	427	43	26		341	341		325	16		409
Yellowtail	2017	707	427	43	26		341	341		325	16		409
Flounder	2018	900	427	43	26		341	341		325	16		409
American	2016	1,695	1,297	26	26		1,183	1,183		1,160	23		1,235
Plaice	2017	1,748	1,336	27	27		1,218	1,218		1,195	23		1,272
	2018	1,840	1,404	28	28		1,280	1,280		1,256	24		1,337
Witch	2016	521	399	12	59		312	312		304	7		409
Flounder	2017	745	399	12	59		312	312		304	7		409
(75%Fmsy)	2018	982	399	12	59		312	312		304	7		409
Witch	2016	521	460	12	59		370	370		361	8		441
Flounder	2017	732	460	12	59		370	370		361	8		441
(Preferred)	2018	954	460	12	59		370	370		361	8		441
Witch	2016	521	500	12	59		408	408		398	9		479
Flounder	2017	732	500	12	59		408	408		398	9		479
(ABC=500)	2018	954	500	12	59		408	408		398	9		479
GB Winter	2016	957	668		60		590	590		584	6		650
Flounder	2017	1,056	668		60		590	590		584	6		650
	2018	1,459	668		60		590	590		584	6		650
GOM	2016	1,080	810	122	16		639	639		604	35		776
Winter	2017	1,080	810	122	16		639	639		604	35		776
Flounder	2018	1,080	810	122	16		639	639		604	35		776
SNE/MA	2016	1,041	780	70	94		585	585		514	71		749
Winter	2017	1,021	780	70	94		585	585		514	71		749
Flounder	2018	1,587	780	70	94		585	585		514	71		749

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
Redfish	2016	13,723	10,338	103	207		9,526	9,526		9,471	55		9,837
	2017	14,665	11,050	111	221		10,183	10,183		10,124	59		10,514
	2018	15,260	11,501	115	230		10,598	10,598		10,537	61		10,943
White Hake	2016	4,985	3,754	38	75		3,459	3,459		3,434	25		3,572
	2017	4,816	3,624	36	72		3,340	3,340		3,315	24		3,448
	2018	4,733	3,560	36	71		3,281	3,281		3,257	24		3,387
Pollock	2016	27,668	21,312	1,279	1,279		17,817	17,817		17,705	112		20,374
	2017	32,004	21,312	1,279	1,279		17,817	17,817		17,705	112		20,374
	2018	34,745	21,312	1,279	1,279		17,817	17,817		17,705	112		20,374
GOM/GB Windowpane Flounder	2016	243	182	2	109		66	66			66		177
	2017	243	182	2	109		66	66			66		177
	2018	243	182	2	109		66	66			66		177
SNE/MA Windowpane Flounder	2016	833	623	37	249	209	104	104			104		599
	2017	833	623	37	249	209	104	104			104		599
	2018	833	623	37	249	209	104	104			104		599
Ocean Pout	2016	220	165	2	17		137	137			137		155
	2017	220	165	2	17		137	137			137		155
	2018	220	165	2	17		137	137			137		155
Atlantic Halibut	2016	210	124	25	4		91	91			91		119
	2017	210	124	25	4		91	91			91		119
	2018	210	124	25	4		91	91			91		119
Atlantic Wolffish	2016	110	82	1	3		72	72			72		77
	2017	110	82	1	3		72	72			72		77
	2018	110	82	1	3		72	72			72		77

Table 11 - CAI Hook Gear Haddock SAP TACs (FY2014 - FY2016).

Year	Exploitable Biomass (thousand mt)	WGB Exploitable Biomass	B(year)/B(2004)	TAC (mt, live weight)
2016	428,303	149,906	5.488	6,202
2017	739,567	258,848	9.477	10,709
2018	1,145,309	400,858	14.677	16,584

4.1.2.2.1 Sub-Option 1: Scallop Fishery Sub-ACL for SNE/MA Yellowtail Flounder

As part of the specification setting process, the Council considered development of a scallop fishery sub-ACL for SNE/MA yellowtail flounder. Both sub-options would continue to specify scallop fishery sub-ACLs for SNE/MA yellowtail founder based on the scallop fishery's projected catch (as opposed to a fixed percentage). A sub-ACL for SNE/MA yellowtail flounder for the scallop fishery was adopted through Amendment 16, and the Council selected an allocation for the scallop fishery though FW44 and FW50. Since FY2011, the sub-ACL has been based on 90 percent of the estimated scallop fishery catch, though the Council is not bound by its earlier decisions. Council recommended that the SNE/MA yellowtail flounder sub-ACL be set at 90% of the scallop fishery's estimated catch for FY 2016 – FY 2018. Table 12 describes projected SNE/MA yellowtail catch in the scallop fishery based on the Council's preferred alternative in Scallop FW27 (Alternative 3a).

Table 12 - Summary of projected SNE/MA yellowtail flounder bycatch estimates (mt) for Scallop Framework 27 preferred alternative and potential sub-ACL allocations (100% and 90% of estimated catch). The management uncertainty buffer for the scallop fishery SNE/MA yellowtail flounder sub-ACL is 7%. For FY 2016, the average of the lower and upper estimate was used to calculate the ABCs and resulting ACLs. Final scallop sub-ACL values are shown in Table 10.

SNE/MA YT – US ABC = 267 mt in FY 2016 - FY 2018	
FY	Alt. 3a Projections (resulting sub-ACLs)
2016	38.0 – 38.6 (100%=35 mt , 90%=32 mt)
2017	40.4 (100%=38, 90% = 34 mt)
2018	43.9 (100%=41, 90% = 37 mt)

In addition, there are existing provisions in the regulations that manage this sub-ACL in a manner that prevents the loss of available yield of this stock. NMFS currently evaluates catches of SNE/MA yellowtail flounder by the scallop fishery by January 15 of the fishing year. If the catch estimate indicates 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 to 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 change to the sub-ACL.

4.1.2.2.1.1 Sub-Option 1A – 90% of estimated scallop fishery catch (*Preferred Option*)

Sub-Option 1A would set the SNE/MA yellowtail flounder ABC and sub-ACL at 90% of the scallop fishery's estimated catch for FY 2016 – FY 2018. A comparison of the scallop catch estimates, and resulting sub-ACLs are shown in Table 12.

Rationale: Specifying a sub-ACL at 90% of projected catch would incentivize the scallop fishery to reduce catches of SNE/MA yellowtail flounder. An allocation of 90% of estimated catch is consistent with the Council's approach in recent years.

4.1.2.2.1.2 Sub-Option 1B – 100% of estimated scallop fishery catch

Sub-Option 1B would set the SNE/MA yellowtail flounder ABC and sub-ACL at 100% of the scallop fishery's estimated catch for FY 2016 – FY 2018. A comparison of the scallop catch estimates, and resulting sub-ACLs are shown in Table 12.

Rationale: Specifying a sub-ACL at 100% of projected catch may not incentivize the scallop fishery to reduce catches of SNE/MA yellowtail flounder. Conversely, as the Council has set the scallop sub-ACL at 90% of the estimated catch in multiple FWs, estimated catch may already account for bycatch reduction efforts.

4.1.2.2.2 Sub-Option 2: Witch Flounder ABCs

The Council considered multiple witch flounder ABCs throughout the development of FW55. At its December 2015 meeting, the Council recommended a preliminary ABC for witch flounder of 394 mt. This ABC was set by applying the SSC's 75%F_{MSY} control rule to projections. At the December 2015 meeting, the Council also requested that the SSC develop an additional 2016 ABC for witch flounder without being constrained by the 75%F_{MSY} control rule. The Council did this with the understanding that the SSC may choose to recommend an ABC between 75%F_{MSY} and the OFL after identifying biological, economic, and social impacts. Between the December Council meeting and the SSC's January 2016 meeting, the groundfish PDT updated the bridge year catch estimate (CY 2015) to 601 mt (a reduction of 36 mt from the previous estimate). The revised catch assumption resulted in an increase in the 75%F_{MSY} estimate to 399 mt. Table 10 specifies witch flounder sub-ACLs when the ABC is set to 75%Fmsy (399 mt), 460 mt (Council preferred), and 500 mt (SSC's upper limit). See Appendix I for additional information on the witch flounder ABC recommendations.

4.1.2.2.2.1 Sub-Option 2A – Witch Flounder ABC of 75%Fmsy (399 mt)

Sub-Option 2A would set the witch flounder ABC at 399 mt based on the 75%Fmsy control rule.

Rationale: The Council did not select the preliminary ABC of 399 mt after considering the SSC's characterization of the range of risks and benefits of setting an ABC greater than 75% $F_{MSY.}$ An ABC of 399 mt would not mitigate economic impacts on fishing communities, particularly for small vessels.

4.1.2.2.2.2 Sub-Option 2B – Witch Flounder ABC of 460 mt (*Preferred Option*)

Sub-Option 2B would set the witch flounder ABC at 460 mt. This value is below the legal limit of 500 mt put forward by the SSC.

Rationale: An ABC of 460 mt (i.e., the mid-point between 75%F_{MSY} and F_{MSY} from the FY 2016 projections) balances the economic impacts on fishing communities, particularly for small vessels, with biological concerns of an increased risk of overfishing.

4.1.2.2.2.3 Sub-Option 2C – Witch Flounder ABC of 500 mt

Sub-Option 2C would set the witch flounder ABC at 500 mt, equal to the upper bound put forth by the SSC.

Rationale: An ABC of 500 mt is below the OFL. The SSC provided this value as an upper limit.

4.2 Fishery Program Administration

4.2.1 Implementation of an Additional Sector

4.2.1.1 Option 1: No Action

No Action. The list of operating sectors would be limited to the 24 sectors that have been authorized through prior actions.

4.2.1.2 Option 2: Implement a New Sector for FY 2016 (*Preferred Alternative*)

One additional sector submitted an application to the Council for operations in 2016, and is included in Framework 55. This sector would be called the Sustainable Harvest Sector II, which would be comprised of active groundfish vessels, similar to the existing Sustainable Harvest Sectors. With this alternative, the Council would approve the formation of Sustainable Harvest Sector II. NMFS must still review the sector operations plan submitted by Sustainable Harvest Sector II to ensure that it contains the required provisions for operation, and that a sufficient analysis is completed under the provisions of the National Environmental Policy Act. NMFS would make the final determination concerning what sectors are approved and allocated ACE for operations for FY 2016 within the final rule to implement FY 2016 Sectors, expected by May 1, 2016.

Rationale: The Council received one new sector application for consideration in FW 55. A sector that wishes to begin operating in a given fishing year is required to submit a proposal and preliminary operations plan one year prior to the beginning of that fishing year. The addition of this new sector would provide flexibility for fishery participants to adapt to changing regulatory and legal circumstances.

4.2.2 Sector Approval Process

4.2.2.1 Option 1: No Action

No Action. The process for creating a new sector, as described in Amendment 16, would not change. Under current regulations, an appropriate NEPA document must be prepared by a potential new sector and submitted to NMFS through the Council in an action that assesses the impacts of forming the sector.

Sector operations plans must be reviewed and approved before the sector can operate. A sector must submit its preliminary operations plan to the Council no less than one year prior to the date that it plans to begin operations. The Council must decide whether or not to approve the implementation of an additional sector through an action (Amendment or Framework). Any sector that is authorized by the Council must also submit an operations plan to NMFS. Final operations plans may cover a two-year period and must be submitted to NMFS no later than September 1 prior to the fishing year in which the sector will operate. NMFS may consult with the Council and will solicit public comment on the operations plan consistent with the Administrative Procedures Act (APA). Upon review of the public comments, the RA may approve or disapprove sector operations through a final determinate consistent with the APA.

4.2.2.2 Option 2: Revised Process for Approving New Northeast Groundfish Sectors (*Preferred Alternative*)

The process for approving new groundfish sectors would be changed, such that new sectors would not need to be approved through a Council action. A sector would be required to notify the Council and NMFS in writing of its intent to form a new sector no later than 30 days prior to the deadline to submit an operations plan for the following fishing year.

A sector would submit an operations plan consistent with the existing process for operations plan approval. The operations plan shall be accompanied by a cover letter requesting formation of the new sector and the approval of the operations plan. After the deadline to submit operations plans for new sectors, NMFS would notify the Council in writing of its intent to consider new sectors for approval. Prior to the approval of new sector(s), the Council would add review of new sectors to the agenda of the next available Council meeting (prior to NMFS final decision). The Council would also provide the Groundfish Committee an opportunity to discuss the proposals in a public meeting prior to the Council meeting. Council comments would be submitted to NMFS prior to rulemaking, and NMFS would only approve a new sector upon the Council's endorsement. NMFS would explain any deviations from those recommendations when sectors are approved/disapproved.

NMFS would make a determination about formation of the proposed sector consistent with the APA, and would approve or disapprove the operations plan through the existing process.

Rationale: This option would add flexibility to the sector approval process, particularly with regard to the requirement for the Council to approve new sectors through a Council Action, and the requirement to submit a new sector formation proposal one year prior to when the sector wishes to begin operations. This option would continue to allow the Council to review new sector applications for consistency with the requirements and goals of the sector program in section 4.2.3 of Amendment 16 (p.98), and would not allow for the formation of a new sector without the Council's endorsement.

4.2.3 Modification to the Definition of the Haddock Separator Trawl

4.2.3.1 Option 1: No Action

If this option is adopted, there would be no change to the current definition of the haddock separator trawl at 50 CFR 648.85(a)(3)(iii)(A):

> *(A) Haddock Separator Trawl. A haddock separator trawl is defined as a groundfish trawl modified to a vertically oriented trouser trawl configuration, with two extensions arranged one over the other, where a codend shall be attached only to the upper extension, and the bottom extension shall be left open and have no codend attached. A horizontal large mesh separating panel constructed with a minimum of 6.0 inch (15.2 cm) diamond mesh must be installed between the selvedges joining the upper and lower panels, as described in paragraph (a)(3)(iii)(A) and (B) of this section, extending forward from the front of the trouser junction to the aft edge of the first belly behind the fishing circle.*
>
> *(1) Two-seam bottom trawl nets—For two seam nets, the separator panel will be constructed such that the width of the forward edge of the panel is 80-85 percent of the width of the after edge of the first belly of the net where the panel is attached. For example, if the belly is 200 meshes*

wide (from selvedge to selvedge), the separator panel must be no wider than 160-170 meshes wide.

(2) Four-seam bottom trawl nets—For four seam nets, the separator panel will be constructed such that the width of the forward edge of the panel is 90-95 percent of the width of the after edge of the first belly of the net where the panel is attached. For example, if the belly is 200 meshes wide (from selvedge to selvedge), the separator panel must be no wider than 180-190 meshes wide. The separator panel will be attached to both of the side panels of the net along the midpoint of the side panels. For example, if the side panel is 100 meshes tall, the separator panel must be attached at the 50th mesh.

4.2.3.2 Option 2: Revised definition of the haddock separator trawl (*Preferred Alternative*)

The current definition of the haddock separator trawl would be changed, requiring that the horizontal large mesh separator panel must have mesh of a contrasting color to those sections of the net that it separates. All other net specifications would remain unchanged.

Rationale: Option 2 would make the separator panel in the trawl highly visible, thereby improving the identification of the separator panel in the net, facilitating enforcement of the haddock separator trawl. It is expected that a clearly recognizable separator panel would led to faster inspections by the United States Coast Guard, allowing vessels to continue on with normal fishing operations in a more timely manner.

4.3 Commercial and Recreational Fishery Measures

4.3.1 Groundfish Monitoring Program

4.3.1.1 Option 1: No Action

No Action. The groundfish monitoring program would remain as defined in Amendment 16 and Framework 48, including the goals, objectives, and standards for monitoring the fishery, as well as the responsibility for funding monitoring, as outlined below.

The goals and objectives of groundfish monitoring programs (§ 648.11(l)) are as follows:

Goal 1: Improve documentation of catch

Objectives:

- Determine total catch and effort, for each sector and common pool, of target or regulated species.
- Achieve coverage level sufficient to minimize effects of potential monitoring bias to the extent possible while maintaining as much flexibility as possible to enhance fleet viability.

Goal 2: Reduce cost of monitoring

Objectives:

- Streamline data management and eliminate redundancy.
- Explore options for cost-sharing and deferment of cost to industry.
- Recognize opportunity costs of insufficient monitoring.

Goal 3: Incentivize reducing discards

Objectives:

- Determine discard rate by smallest possible strata while maintaining cost effectiveness.
- Collect information by gear type to accurately calculate discard rates.

Goal 4: Provide additional data streams for stock assessments

Objectives:

- Reduce management uncertainty and/or biological uncertainty.
- Perform biological sampling if it may be used to enhance accuracy of mortality or recruitment calculations.

Goal 5: Enhance safety of monitoring program

Goal 6: Perform periodic review of monitoring program effectiveness

Other Pertinent Program Elements:

- Amendment 16 specifies that the primary goal of observers or at-sea monitors for sector monitoring is to verify area fished, catch, and discards by species and by gear type.

- The coverage levels for the sector monitoring must be sufficient to at least meet the CV specified in the SBRM at the overall stock level for each stock of regulated groundfish species, and to monitor sector operations in order to reliably estimate overall sector catch. The current SBRM precision standard is a 30 percent CV.

- Electronic monitoring may be used in place of actual observers or at-sea monitors if the technology is deemed sufficient for a specific trip based on gear type and area fished.

- Absent NMFS funding for a sector at-sea monitoring program, sectors are responsible for implementing industry-funded at-sea monitoring programs to monitor their fishing activities in their operations plans which are satisfactory to NMFS for monitoring catch and discards.

- Less than 100% electronic monitoring and at-sea observation will be required.

<u>Methods to Set ASM Coverage Rates</u>

ASM relief for sector trips fishing 10” ELM gillnets on Monkfish DAS in SNE

The No Action alternative would maintain lower ASM coverage rates for sector trips on a Monkfish DAS in the SNE Broad Stock Area using 10” ELM gillnet gear. NMFS has the authority to specify a lower coverage rate than the overall sector coverage rate for these sector trips on an annual basis. Sector vessels operating on these trips are required to land all groundfish of legal size on all sector trips. Sector vessels that declare a monkfish DAS through Pre-trip notification system are prohibited from changing the declaration for that trip.

<u>Coverage Needed to Achieve a CV30</u>

The level of monitoring coverage is specified to achieve the required CV30 precision of the discard estimates for each NE multispecies stock for all sectors and gears combined, with the same coverage level for each sector. The percentage of trips that would need to be assigned an at-sea monitor to achieve a CV30 for the stock is calculated using realized aggregate stock-level CVs using the information from the preceding fishing years. The necessary coverage rates to achieve CV30 have varied for individual stocks each year since 2010. The required ASM coverage level for each fishing year is based on realized stock-level CVs from the most recent year with complete data. Thus, for FY 2016, data from FY 2014 would be used (Figure 21).

<u>Options 2- 5: Alternatives to No Action (Option 1)</u>

The Council considered selecting Options 2, 3, 4, and 5 in this section.

The Council selected several ASM alternatives as preferred alternatives. The Council recommends that a tiered approach to setting ASM coverage rates, whereby NMFS would first calculate the total observer coverage rate using a three year (fishing year) moving average, and then apply the prioritization approach laid out in Option 5. In summary, the Council selected the following ASM alternatives as <u>*preferred*</u>:

- Option 2: Clarification of Groundfish Monitoring Goals and Objectives
- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs
- Sub-Option 3B: Multi-year approach to setting sector coverage
- Sub-Option 4A: Remove ASM coverage requirements for sector trips fishing extra-large mesh (ELM) gillnet gear in Broad Stock Areas (BSAs) 2 and 4
- Option 5: Fishery performance criteria for predicting the target coverage level

4.3.1.2 Option 2: Clarification of Groundfish Monitoring Goals and Objectives (*Preferred Alternative*)

This option would clarify that the primary goal of the groundfish sector at-sea monitoring program is to verify area fished, catch, and discards by species, by gear type; and meeting these primary goals should be done in the most cost effective means practicable. All other goals and objectives of groundfish monitoring programs at §648.11(l) are considered equally-weighted secondary goals..

Rationale: This option would clarify the goals and objectives for the at-sea monitoring program as they apply to the sector ASM program.

4.3.1.3 Option 3: Clarification of methods used to set sector coverage rates

The Council considered selecting Sub-Option 3A and 3B.

Adequate coverage (where coverage refers to combined NEFOP, ASM and EM) is required to meet the need for both the precision and accuracy of discard estimates. The options below – including requirements for coverage adequate to meet a precision standard (CV30) - would be interpreted and applied consistent with the overarching goals and objectives of the sector monitoring program.

4.3.1.3.1 Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)

Option 3A would clarify the Council's intent that total coverage levels for sectors should be set using only realized stock level CVs. Since FY 2012, NMFS has considered it desirable to set groundfish sector coverage levels so that 80 percent of the discard estimates have CV30 at the sector/stock/gear level. This has resulted in setting ASM coverage at levels higher than what was needed to achieve a CV30 at the overall stock level. Overall ASM coverage levels should not be set using an administrative standard of monitoring a percentage of discarded pounds at a CV30.

Rationale: This option would further clarify sector monitoring policy set through Amendment 16 and Framework 48 by clarifying that a secondary administrative standard should not be applied when determining ASM coverage levels. This clarification does not preclude NMFS from considering factors other than the SBRM CV standard when determining appropriate coverage levels.

4.3.1.3.2 Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

Option 3B would specify that the most recent three-year average the predicted coverage rates (based on realized stock level CVs) would be used when determining ASM coverage levels on an annual basis, consistent with the requirement that minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology at the overall stock level. For example, the *coverage rate* needed to achieve a CV30 over three years would be added and then divided by three (e.g., (percent coverage necessary to meet the required coefficient of variation in year 1 + year 2 + year 3)/ 3).

Rationale: This option would further clarify sector monitoring policy set through Amendment 16 and Framework Adjustment 48 by clarifying that the most recent three years of data should be used when determining ASM coverage for the upcoming fishing year. Since FY 2012, NMFS has used the most recent year of available data to set determine coverage needed to achieve a CV30 at the stock level. While this approach has yielded relatively consistent coverage rates to-date, there is the potential that variability in a single stock could lead to wide fluctuations in the target coverage levels in the future. Using a moving average is likely to help stabilize the predicted coverage levels that are needed.

4.3.1.4 Option 4: Remove ASM Coverage Requirements for a sub-set of sector gillnet trips

The Council considered selecting both Sub-Options 4A and 4B.

4.3.1.4.1 Sub-Option 4A: Remove ASM coverage requirements for sector trips fishing extra-large mesh (ELM) gillnet gear in Broad Stock Areas (BSAs) 2 and 4 (*Preferred Alternative*)

ASM coverage would be removed for sector vessels fishing exclusively with extra-large mesh (ELM) gillnets of 10" or greater on a sector trip fishing exclusively in BSA 2 or BSA 4 (Figure 1). Vessels making an ELM declaration would not be subject to ASM coverage. A vessel declaring an ELM trip would still be prohibited from changing its declaration for that trip, and would be required to retain and land all groundfish of legal size on the trip. This means that ELM gear can only be used on this type of trip (i.e., possession of, transiting with, or tending a smaller mesh on the same trip would be prohibited). NMFS would need to revise the PTNS to allow a vessel to indicate a trip would be fishing exclusively ELM gear while on either a groundfish DAS, a monkfish DAS, or both.

Rationale: Option 4A would reduce the cost of monitoring while maintaining coverage levels which are consistent with non-sector trips that target non-groundfish species. The majority of catch on sector trips using ELM gear is of non-groundfish stocks, such as skates, monkfish, and dogfish, while the ASM program was designed, primarily, to ensure that sectors do not exceed their sector allocation and to verify area fished, catch, discards by species, and gear type used..

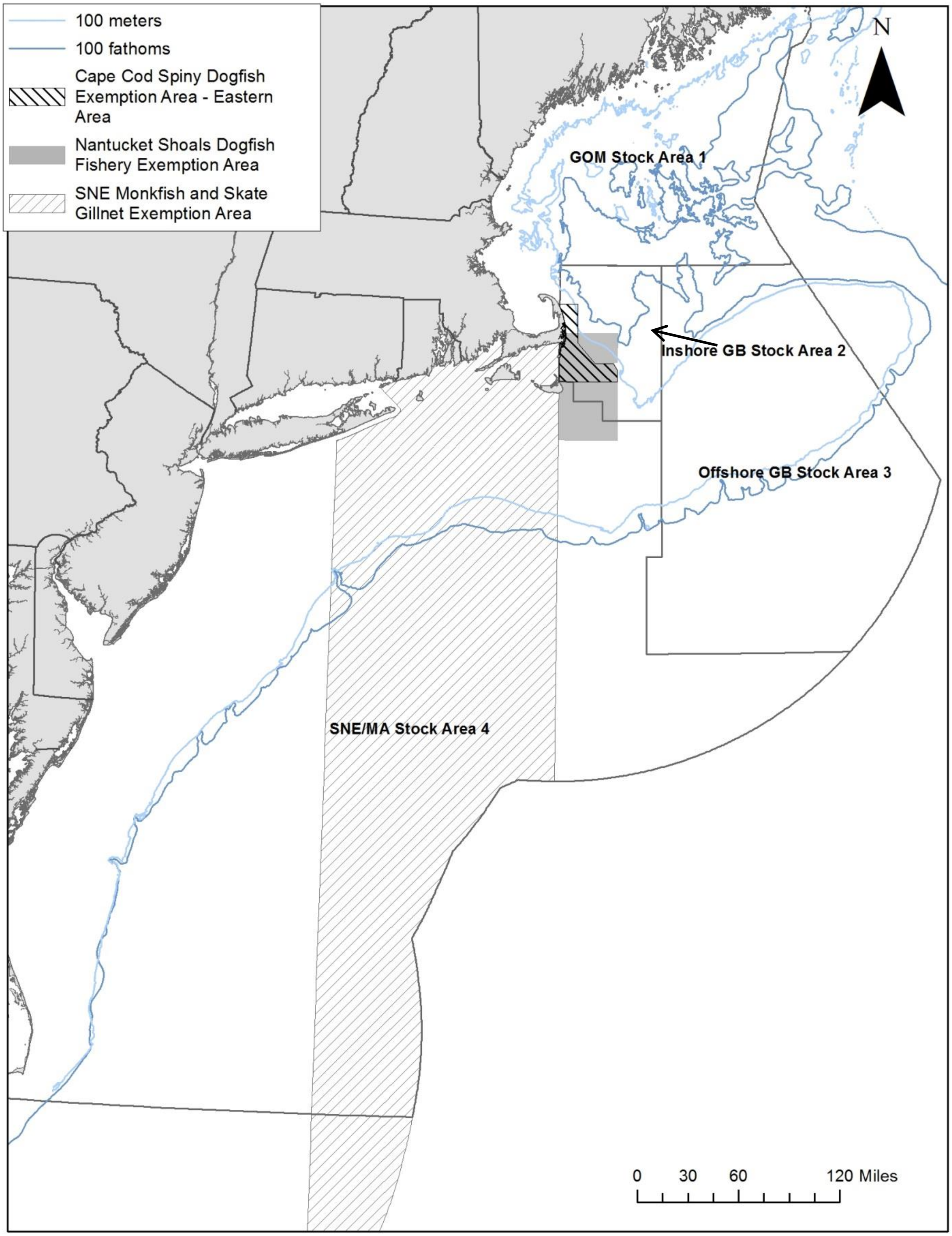
4.3.1.4.2 Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries[1]

ASM coverage would be removed for sector vessels fishing exclusively within the footprint and season of either the Nantucket Shoals Dogfish Exemption Area, the Eastern Area of the Cape Cod Spiny Dogfish Exemption Area, and SNE Dogfish Gillnet Fishery Exemption Area (Figure 1). Vessels making a declaration to fish in these areas would not be subject to ASM coverage. A vessel declaring to fish as a sector trip within a dogfish exemption area would still be prohibited from changing its declaration for that trip, and would be required to retain and land all groundfish of legal size on the trip. This means that only gillnet gear of 6.5" and greater can only be fished on this type of trip. NMFS would need to revise the PTNS to allow a vessel to indicate a trip would be fishing exclusively inside the footprint and season of dogfish exempted fisheries on either a groundfish DAS, a monkfish DAS, or both.

Rationale: Option 4B would reduce the cost of monitoring while maintaining coverage levels which are consistent with non-sector trips that target non-groundfish species. The majority of catch on sector trips using 6.5" diamond mesh gillnets or greater in BSA 2 and 4 is of non-groundfish stocks, such as skates, monkfish, and dogfish. Groundfish catch is known to be very low with the area and season of dogfish exempted fisheries, and groundfish catch on these trips would be counted against the sector's ACE. The ASM program was designed, primarily, to ensure that sectors do not exceed their sector allocation and to verify area fished, catch, discards by species, and gear type used. Removing the ASM requirement for trips fishing multiple mesh sizes exclusively within the footprint of existing dogfish exempted fisheries would reduce the cost of monitoring for sectors.

[1] The Council recommends that relief from ASM coverage for sector gillnet trips fishing ELM gear within the footprint of existing dogfish exempted fisheries should be handled by NOAA Fisheries in sector operations plans.

Figure 1 - Groundfish Broad Stock Areas and Spiny Dogfish Exemption Areas under consideration in 4.3.1.4.



4.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

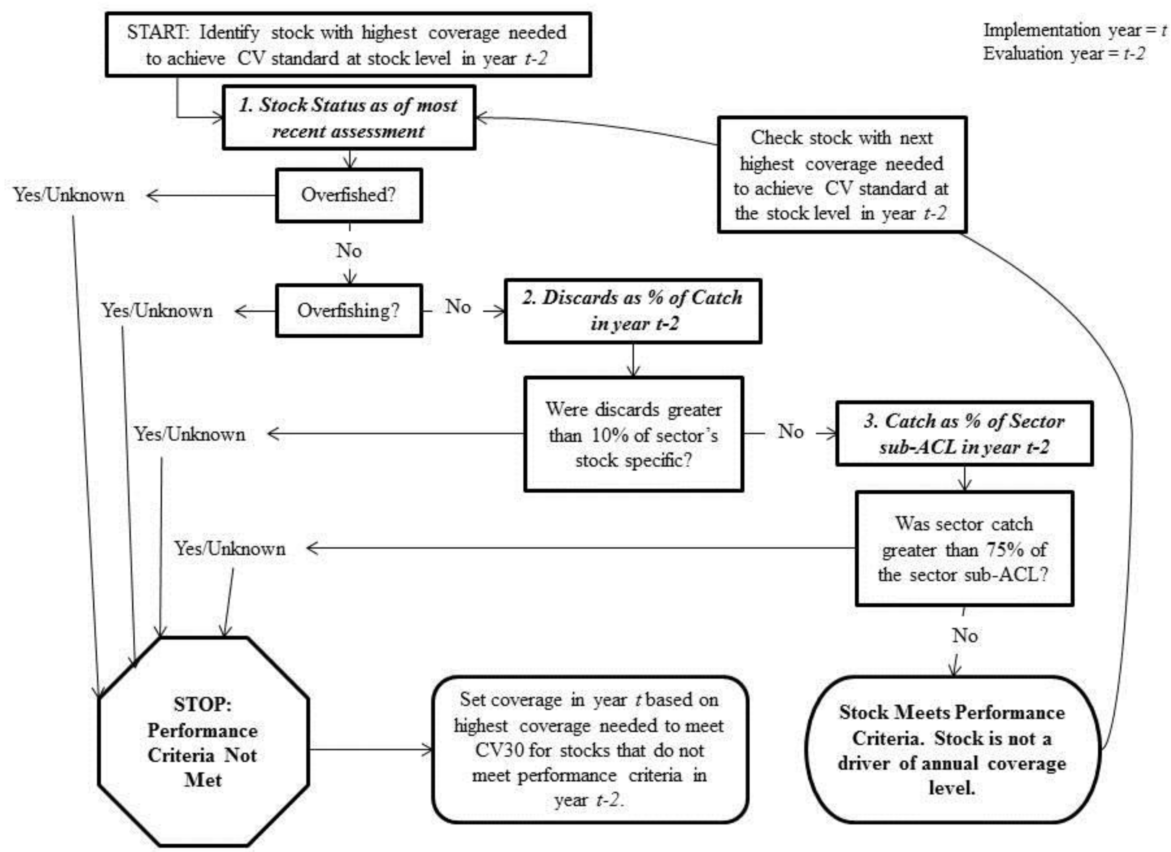
Fishery performance criteria would be used in setting groundfish sector coverage levels. Application of the CV standard would be filtered consistent with existing goals for the monitoring program, such that stocks that meet the performance criteria are not drivers for the annual coverage level. This does not remove the 30 percent CV standard; rather, stocks that meet these criteria would not dictate the predicted ASM coverage needs for a given fishing year. Realized ASM coverage levels would need to be consistent with the Goals and Objectives of groundfish monitoring program as adopted through FW48 (see 4.3.1.1).

The three fishery performance criteria would be:

1. Stock Condition – Not overfished and overfishing is not occurring.
2. The percentage of sector sub-ACL catch comprised of discards (less than or equal to 10%).
3. The percentage of the sector sub-ACL harvested (less than or equal to 75%).

In practice, coverage levels would be set based on the stock with the highest coverage level needed to achieve the CV standard. Figure 2 describes the process for determining coverage levels by iterating through each of the criteria.

Figure 2 - Process for applying the performance criteria when setting coverage rates.



Rationale: Option 5 reduces the cost of monitoring while maintaining coverage levels sufficient to improve the documentation of catch, incentivize reducing discards, and provide additional data streams for stock assessments. By using performance criteria to identify healthy stocks for which percentage of the sub-ACL harvested and discards of stock-specific catch are low, the performance criteria reduce the chance that a realized stock specific CV above the standard would result in sectors exceeding their sub-ACL. In doing so, Option 3 seeks to balance the goals of minimizing the effects of potential monitoring bias to the extent possible while maintaining as much flexibility as possible to enhance fleet viability. The Council considered a range of catch as a percentage of the sector sub-ACL of 50% - 75%, and discards as a percentage of catch from 5% - 10%. The Council clarified that it's preferred performance criteria thresholds are stock specific catch is equal to or less than 75% of the sector sub-ACL and discards are equal to or less than 10% of catch.

4.3.2 Management Measures for U.S. Georges Bank Cod TACs

This section considers changing fishery management measures as necessary to adjust catches of US/CA stocks. Eastern GB cod is a sub-unit of the overall GB cod stock, and the total ABC for GB cod includes the shared U.S./Canada TAC for the Eastern U.S./Canada Area. Sectors and state-operated permit banks receive two allocations of GB cod ACE, an Eastern GB cod ACE and a Western GB cod ACE.

4.3.2.1 Option 1: No Action

No Action. Eastern GB cod ACE can only be harvested in the Eastern U.S./Canada Area, and the remaining portion of a sector's total GB cod allocation can only be caught in the Western U.S./Canada Area. There would be no adjustment to the amount of the U.S. TAC for Eastern GB cod that is allocated to the Eastern U.S./Canada Management Area. Eastern GB cod is a sub-unit of the total GB cod stock. The amount of the shared U.S./Canada TAC for eastern GB cod is deducted from the total ABC for GB cod. Under the current regulations, the U.S. share of the eastern GB cod can only be caught in the eastern U.S./Canada Management Area, and the remaining portion of the total ABC is only available outside if the eastern U.S./Canada Management Area.

4.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod (*Preferred Alternative*)

A sector, or state-operated permit bank, may convert its Eastern GB cod ACE to Western GB cod ACE at any time during the fishing year, and up to two weeks into the following fishing year. A potential ACE conversion will be proposed to, and approved by, NMFS based on conditions such as (but not limited to)whether the applicant is complying with reporting or other administrative requirements. NMFS would notify the applicant if the conversion is approved or disapproved. Ensuring that sufficient ACE is available to cover the conversion is the responsibility of the sector or permit bank. Once a portion of Eastern GB cod ACE has been converted to Western GB cod ACE by a sector or permit bank, that portion of the ACE remains Western GB cod ACE for the remainder of the fishing year and may not be converted back. Western GB ACE may not be transferred to the Eastern U.S./Canada Area at any time.

Rationale: Option 2 would provide additional flexibility for sectors to harvest GB cod, while ensuring that the U.S. does not exceed its TAC for Eastern GB cod. Sectors and state run permit banks receive eastern GB allocations as a share of their overall GB cod allocation. This creates situations where vessels which have never fished in the Eastern U.S./Canada area have allocations of EGB cod. This limits the amount of cod that could be caught in the Western area, may unnecessarily reduce flexibility, and potentially limit fishing in the Western U.S./Canada Area even if a sector has not caught its entire allocation of GB cod. This alternative mirrors a provision adopted in FW 51, which allows sectors and state operated permit banks to move Eastern GB haddock ACE to the western GB fishery.

4.3.3 Modification to the Gulf of Maine Cod Protection Measures

4.3.3.1 Option 1: No Action

No Action. There would be no changes to the Gulf of Maine Cod Protection Measures implemented on May 1, 2015 date through FW 53. For the recreational fishery, these measures include prohibiting the possession of GOM cod. The recreational possession limit for GOM cod would remain at zero, and could only be adjusted through a future Council action. For the commercial fishery, these measures include a suite of time and area closures (Table 3) that are subject to review when the GOM cod stock biomass reaches 50% of SSBMSY. Commercial and recreational vessels are not allowed to fish in the Whaleback cod spawning closure from April – June regardless of the status of the GOM cod stock

Table 13 – Timing and statistical areas of the Gulf of Maine Cod Protection Closures for the Commercial Fishery.

<table>
<tr><th>Month</th><th>Sector Closures</th><th>Common Pool Closures</th></tr>
<tr><td>May</td><td colspan="2">132, 133, 138, 139, 140, and 125 north of 42° 20’</td></tr>
<tr><td>June</td><td colspan="2">132, 139, 140, 146, 147, and 125 north of 42° 20’</td></tr>
<tr><td>July</td><td>None</td><td>None</td></tr>
<tr><td>August</td><td>None</td><td>None</td></tr>
<tr><td>September</td><td>None</td><td>None</td></tr>
<tr><td>October</td><td>None</td><td>124 and 125</td></tr>
<tr><td>November
December
January</td><td colspan="2">125 and a portion of 124 defined by the following coordinates:
42° 00' N…70° 30' W
42° 00 N…70° 24' W
42° 15' N…70° 24' W
42° 15' N…70° 30' W</td></tr>
<tr><td>February</td><td>None</td><td>None</td></tr>
<tr><td>March</td><td>None</td><td>121, 122, and 123</td></tr>
<tr><td>April</td><td>None</td><td>None</td></tr>
</table>

4.3.3.2 Option 2: Modify GOM cod recreational possession limits (*Preferred Alternative*)

NMFS currently sets recreational management measures though consultation with the Council, and has the authority to modify bag limits, size limits, and seasons. Recreational measures are currently developed using a bio-economic model, which assumes that recreational anglers catch both cod and haddock while prosecuting the fishery. Removing the zero possession limit of GOM cod would expand the range of possible management outcomes based on the most recent scientific information.

The preferred alternative would remove the prohibition on recreational GOM Cod possession to aAllow the Regional Administrator (RA) to once again change the possession limit of GOM cod for the recreational fishery. The RA would be allowed to set the GOM cod possession limit for the recreational fishery as an accountability measure (AM) after consultation with the Council.
Rationale: Option 2 would increase flexibility in setting management measures for the recreational fishery by allowing recreational possession limits for GOM cod to be set by NMFS, and not through a Council action. FW 48 revised the recreational AM so that the regional administrator may adjust

management measures to ensure that the recreational fishery will achieve, but not exceed, its sub-ACL, and Option 2 would return to this approach.

NMFS currently sets recreational management measures though consultation with the Council, and has the authority to modify bag limits, size limits, and seasons. Recreational measures are currently developed using a bio-economic model, which assumes that recreational anglers catch both cod and haddock while prosecuting the fishery. Removing the zero possession limit of GOM cod would expand the range of possible management outcomes based on the most recent scientific information.

5.0 ALTERNATIVES CONSIDERED AND REJECTED

The Council did not elect to move any alternatives to considered and rejected during the development of FW55.

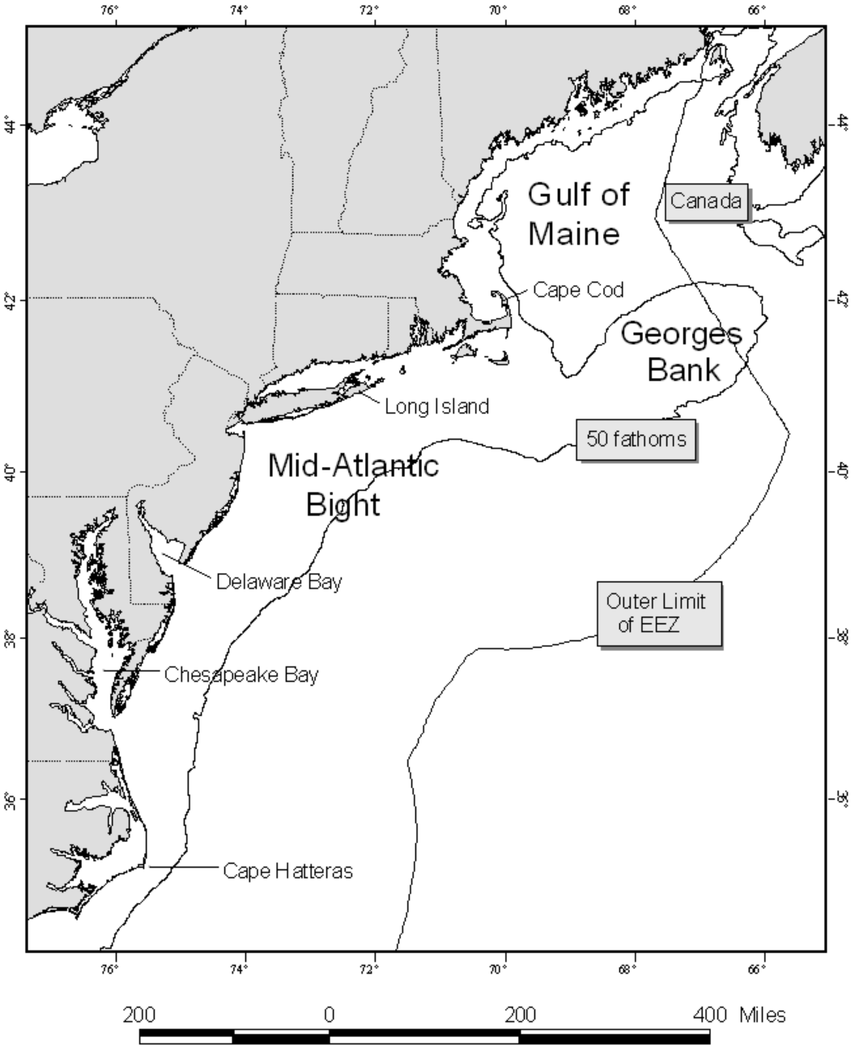
6.0 AFFECTED ENVIRONMENT

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 3) includes 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 (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 6,562 ft (2,000 m). Four distinct sub-regions are identified: the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. The groundfish fishery primarily occurs in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic areas. Therefore, the description of the physical environment focuses on these sub-regions. The distinctive features of Southern New England are included in the sections describing Georges Bank and the Mid-Atlantic Bight.

Figure 3 - Northeast U.S. Shelf Ecosystem

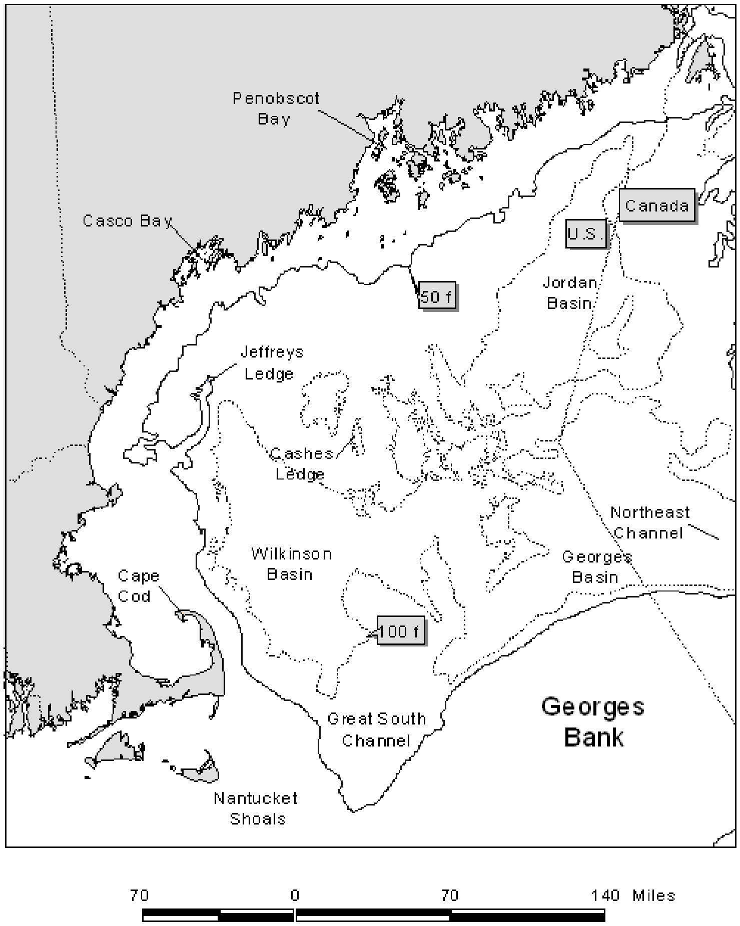


Source: Stevenson et al. (2004).

6.1.1 Gulf of Maine

The Gulf of Maine is bounded on the east by Browns Bank, on the north by the Nova Scotia (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Figure 4). The Gulf of Maine is a boreal environment 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 820 ft. (250 m), with a maximum depth of 1,148 ft (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 30 ft (9 m) below the surface.

Figure 4 - Gulf of Maine



Source: Stevenson et al. (2004).

The Gulf of Maine is an enclosed coastal sea that was glacially derived and contains a system of deep basins, moraines, and rocky protrusions. The Gulf of Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast. 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,[2] 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 water depth of about 197 ft. (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 66 - 131 ft. (20 - 40 m), except off eastern Maine where a gravel-covered plain exists to depths of at least 328 ft. (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 (Stevenson, et al. 2004).

[2] 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.

The geologic features of the Gulf of Maine, coupled with the vertical variation in water properties (e.g., salinity, depth, temperature), 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. Bivalves, sea cucumbers, sand dollars, annelids, and sea anemones dominated biomass. Watling (1998) identified seven different bottom assemblages that occur on the following habitat types:

1. Sandy offshore banks: fauna are characteristically sand dwellers with an abundant interstitial component;
2. Rocky offshore ledges: fauna are predominantly sponges, tunicates, bryozoans, hydroids, and other hard bottom dwellers;
3. Shallow [<197 ft. (60 m)] temperate bottoms with mixed substrate: fauna population is rich and diverse, primarily comprised of polychaetes and crustaceans;
4. Primarily fine muds at depths of 197 - 459 ft. (60 - 140 m) within cold Gulf of Maine Intermediate Water:[3] fauna are dominated by polychaetes, shrimp, and cerianthid anemones;
5. 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;
6. Deep basin, muddy bottom, overlaying water usually 45 - 46°F (7 - 8°C): fauna densities are not high, dominated by brittle stars and sea pens, and sporadically by tube-making amphipods; and
7. Upper slope, mixed sediment of either fine muds or mixture of mud and gravel, water temperatures always >46°F (8°C): upper slope fauna extending into the Northeast Channel.

Two studies (Gabriel 1992; Overholtz & Tyler 1985) reported common[4] 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.

6.1.2 Georges Bank

Georges Bank is a shallow (10 - 492 ft. [3 - 150 m depth]), elongated (100 mi.(161 km) wide by 20 mi (322 km) long) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Figure 3). It has a steep slope on its northern edge, a broad, flat, gently sloping southern flank, and steep submarine canyons on its eastern and southeastern edges. It has highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework

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

the sediments on Georges Bank. Erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents may reduce the amount of sand and cause an overall coarsening of the bottom sediments (Valentine & Lough 1991).

Bottom topography on eastern Georges Bank consists of 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 has 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 164 ft. (50 m). Sediments in this region include 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 the 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. These differences influence productivity and may influence fish abundance and distribution.

Georges Bank has historically had 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, while sand dollars and bivalves dominated the overall biomass (Theroux & Wigley 1998). Using the same database, Theroux and Grosslein (1987) identified four macrobenthic invertebrate assemblages that occur on similar habitat type:

1. The Western Basin assemblage is found in comparatively deep water (492 - 656 ft. [150 - 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.
2. The Northeast Peak assemblage is found in variable depths 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.
3. The Central Georges Bank assemblage occupies the greatest area, including the central and northern portions of Georges Bank in depths <328 ft. (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.
4. The Southern Georges Bank assemblage is found on the southern and southwestern flanks at depths from 262 - 656 ft. (80 - 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.

6.1.3 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 3). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England. It generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight consists 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 62 - 124 ft (100 - 200 km) offshore, where it transforms to the slope (328 - 656 ft. [100 - 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, sea level fluctuations during past ice ages largely shaped the topography of the Mid-Atlantic Bight. 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. Silty sand, silt, and clay predominate on the slope. Permanent sand ridges occur in groups with heights of about 33 ft. (10 m), lengths of 6 - 31 mi (10 - 50 km), and spacing of 1 mi (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 - 10 with heights of about 7 ft. (2 m), lengths of 164 - 328 ft. (50 - 100 m), and 0.6 - 1 mi (1 - 2 km) between patches. Sand waves are temporary features that form and re-form in different locations. They usually occur on the inner shelf, 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 important Mid-Atlantic Bight habitat. Artificial reefs 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 & 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 drawn 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 consist of exposed rock, wrecks, kelp, or other hard material. Boring mollusks, algae, sponges, anemones, hydroids, and coral generally dominate these coastal reefs. 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 generally consist 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.

In terms of numbers, amphipod crustaceans and bivalve mollusks dominate the benthic inhabitants of this primarily sandy environment. Mollusks (70%) dominate the biomass (Stevenson, et al. 2004). Pratt (1973) identified three broad faunal zones related to water depth and sediment type:

1. The “sand fauna” zone is dominated by polychaetes and was defined for sandy sediments (≤1% silt) that are at least occasionally disturbed by waves, from shore out to a depth of about 164 ft. (50 m).

2. 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.
3. Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley supporting the "silt-clay fauna."

While substrate is the primary factor influencing demersal species distribution in the Gulf of Maine and Georges Bank, latitude and water depth are the primary influence in the Mid-Atlantic Bight area.

Colvocoresses and Musick (1984) identified the following assemblages in the Mid-Atlantic sub region during spring and fall.[5]

- 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.

6.1.4 Habitat Requirements for Groundfish

Habitats provide living things with the basic life requirements of nourishment and shelter. This ultimately provides for both individual and population growth. The quantity and quality of available habitat influences the fishery resources of a region. Depth, temperature, substrate, circulation, salinity, light, dissolved oxygen, and nutrient supply are important parameters of a given habitat. These parameters determine the type and level of resource population that the habitat supports. Table 14 briefly summarizes the habitat requirements for each of the large-mesh groundfish species/stocks managed by the Northeast Multispecies FMP. Information for this table was extracted from the original Northeast Multispecies FMP and profiles available from NMFS. EFH 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); eggs of all other species 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.

6.1.5 Essential Fish Habitat Designations

The Sustainable Fisheries Act defines EFH as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The proposed action could potentially affect 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 surf clam 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. Table 14 summarizes the EFH

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

descriptions of the general substrate or bottom types for all the benthic life stages of the species managed under these FMPs. Full descriptions and maps of EFH for each species and life stage are available on the GARFO website at http://www.greateratlantic.fisheries.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.

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	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): 82-245 ft. (25-75 m) (A): 33-492 ft. (10-150 m)	(J): Cobble or gravel bottom substrates (A): Rocks, pebbles, or gravel bottom substrate	Otter trawl, bottom longlines, gillnets
Haddock	Southwestern Gulf of Maine and shallow waters of Georges Bank	Benthic feeders (amphipods, polychaetes, echinoderms), bivalves, and some fish	(J): 115-328 ft. (35-100 m) (A): 131-492 ft. (40-150 m)	(J): Pebble and gravel bottom substrates (A): Broken ground, pebbles, smooth hard sand, smooth areas between rocky patches	Otter trawl, bottom longlines, gillnets
Acadian redfish	Gulf of Maine, deep portions of Georges Bank and Great South Channel	Crustaceans	(J): 82-1,312 ft. (25-400 m) (A): 164-1,148 ft. (50-350 m)	(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): 0-820 ft. (0-250 m) (A): 49-1,198 ft. (5-365 m)	(J): Bottom habitats with aquatic vegetation or substrate of sand, mud or rocks (A): Hard bottom habitats including artificial reefs	Otter trawl, gillnets
Atlantic Halibut	Gulf of Maine, Georges Bank	Juveniles feed on annelid worms and crustaceans, adults mostly feed on fish	(J): 66-197 ft. (20-60 m) (A): 328-2,297 ft. (100-700 m)	(J): Bottom habitat with a substrate of sand, gravel or clay (A): Same as for (J)	Otter trawl bottom longlines
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, mollusks & crustaceans	(E): <164 ft. (<50 m) (L): <164 ft. (<50 m) (J): 262 ft. (<80 m)	(E): Bottom habitats, generally hard bottom sheltered nests, holes or crevices where juveniles are guarded (L): Hard bottom nesting areas (J): Bottom habitat, often smooth areas near rocks or algae	Otter trawl

			(A): 361 ft. (<110 m)	(A): Bottom habitats; dig depressions in soft sediments	
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): 16-738 ft. (5-225 m) (A): 16-1,066 ft. (5-325 m)	(J): Bottom habitat with seagrass beds or substrate of mud or fine-grained sand (A): Bottom habitats with substrate of mud or find grained sand	Otter trawl, gillnets
Yellowtail flounder	Gulf of Maine, Southern New England, Georges Bank	Amphipods and polychaetes	(J): 66-164 ft. (20-50 m) (A): 66-164 ft. (20-50 m)	(J): Bottom habitats with substrate of sand or sand and mud (A): Same as for (J)	Otter trawl
American plaice	Gulf of Maine, Georges Bank	Polychaetes, crustaceans, mollusks, echinoderms	(J): 148-492 ft. (45-150 m) (A): 148-574 ft. (45-175 m)	(J): Bottom habitats with fine grained sediments or a substrate of sand or gravel (A): Same as for (J)	Otter trawl
Witch flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/Southern New England	Mostly polychaetes (worms), echinoderms	(J): 164-1,476 ft. (50-450 m) (A): 82-984 ft. (25-300 m)	(J): Bottom habitats with fine grained substrate (A): Same as for (J)	Otter trawl
Winter flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/Southern New England	Polychaetes, crustaceans	(E): 16 ft. (<5 m) (J): 0.3-32 ft. (0.1-10 m) (3-164 age 1+) (1-50 m) (A): 3.2-328 ft. (1-100 m)	(J): Bottom habitats with a substrate of mud or fine grained sand (A): Bottom habitats including estuaries with substrates of mud, sand, gravel	Otter trawl, gillnets
Atlantic wolffish	Gulf of Maine & Georges Bank	Mollusks, brittle stars, crabs, and sea urchins	(J): 131, 2-787.4 ft. (40-240 m) (A): 131.2-787.4 ft. (40-240 m)	(J): Rocky bottom and coarse sediments (A): Same as for (J)	Otter trawl, bottom longlines, and gillnets
Windowpane flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/Southern New England	Juveniles mostly crustaceans; adults feed on crustaceans and fish	(J): 3.2-328 ft. (1-100 m) (A): 3.2-574 ft. (1-75 m)	(J): Bottom habitats with substrate of mud or fine grained sand (A): Same as for (J)	Otter trawl

6.1.6 Gear Types and Interaction with Habitat

A variety of gears are used to prosecute the multispecies fishery (Table 16). Groundfish vessels fish 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.

Table 15 - Description of the gear types used by the multispecies fishery

	Trawl	**Sink/Anchor Gillnets**	**Bottom Longlines**	**Hook and Line**
Total Length	Varies	295 ft. (90 m) long per net	~1,476 ft. (451 m)	Varies by target species
Lines	N/A	Leadline and floatline with webbing (mesh) connecting	Mainline is parachute cord. Gangions (lines from mainline to hooks) are 15 in (38 cm) long, 3 - 6 in (8 to 15 cm) 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 in [16.5 cm])	No nets, but 12/0 circle hooks are required	No nets, but single to multiple hooks, "umbrella rigs"
Anchoring	N/A	22 lbs (10 kg) Danforth-style anchors are required at each end of the net string	20-24 lbs (9-11 kg) 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/ Use Duration	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

6.1.6.1 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; however, mid-water trawls are prohibited in the Northeast multispecies fishery. Bottom trawls are designed to be towed along the seafloor and to catch a variety of demersal fish and invertebrate species.

Fishermen use the mid-water trawl to capture pelagic species throughout the water column. The mouth of the net typically ranges from 361 - 558 ft. (110 m - 170 m) and requires the use of large vessels. 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. Fishermen usually remove the fish from the net while it remains in the water alongside the vessel by means of a suction pump. Some fishermen remove the fish in the net by repeatedly lifting the codend aboard the vessel until the entire catch is in the hold.

Bottom otter trawls account for nearly all commercial bottom trawling activity. There is a wide range of otter trawl types used in the Northeast due to the diversity of fisheries and bottom types encountered in the region (NEFSC 2002c). 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. Fishermen tow bottom trawls at a variety of speeds, but average about 5.6 km/hour (3 knots). Several federal FMPs manage the use of this gear. 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. As flounders lie in contact with the seafloor, these animals respond to the bottom-tending sweep by swimming up off the bottom where they can be entrained into net. Flatfish trawls are 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 tend to rise higher off the bottom than flatfish (NEFSC 2002).

Bottom otter trawls are rigged with rockhopper gear for use on "hard" bottom (i.e., gravel or rocky bottom), mud or sand bottom with occasional boulders. This type of gear seeks to sweep over irregularities in the bottom without damaging the net. The sweep in trawls rigged for fishing on smooth bottoms looks 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 1.6 - 2.0 ft. (0.5 - 0.6 m) above the bottom. 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 (Carr & Milliken 1998).

The haddock separator trawl and Ruhle trawl (bottom trawls) are used to minimize the catch of cod. The design of these gears considers the behavior of fish in response to gear. A haddock separator trawl is a groundfish trawl modified to a vertically oriented trouser trawl configuration. It has two extensions arranged one over the other. A codend is attached to the upper extension and the bottom extension is left open with no codend attached. A horizontal large mesh separating panel constructed with a minimum of 6-inch diamond mesh must be installed between the selvedges joining the upper and lower panels [648.85(a)(3)(iii)(A)]. Haddock generally swim to the upper part of a net and cod swim to the lower part of the net. By inserting a mesh panel in the net, and using two codends, the net effectively divides the catch. The cod can escape if the codend on the lower part of the net is left open (NEFMC 2003). Overall, the haddock separator trawl has had mixed results in commercial fishing operations. The expected ratios of haddock to cod have not been realized. Catches of other demersal species, such as flounders, skates, and monkfish, have also been higher than expected. However, the separator trawl has reduced catches of these species compared to normal fishing practices (NEFMC 2009b).

The Ruhle trawl (previously known as the haddock rope trawl or eliminator trawl) is a four-seam bottom groundfish trawl with a rockhopper. It is designed to reduce the bycatch of cod while retaining or increasing the catch of haddock and other healthy stocks [648.85(b)(6)(iv)(J)(3)]. NMFS approved the Ruhle trawl for use in the DAS program and in the Eastern U.S./Canada Haddock SAP on July 14, 2008 (73 FR 40186) after nearly two years of testing to determine efficacy. Experiments comparing traditional and the new trawl gear showed that the Ruhle trawl reduced bycatch of cod and flounders, while simultaneously retaining the catch of healthier stocks, primarily haddock. The large, 8-foot mesh in the forward end (the wings) of the Ruhle trawl net allows cod and other fish to escape because of their body shapes and unique behavior around the netting.

6.1.6.2 Gillnet Gear

In addition to trawl gear, the fishery is also prosecuted using gillnets. 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. The meshes of individual gillnets are uniform in size and shape, hence highly selective for a particular size of fish (Jennings et al. 2001). Bottom gillnets are fished in two different ways, as "standup" and "tiedown" nets (Williamson 1998). Standup nets typically catch Atlantic cod, haddock, pollock, and hake and are soaked (duration of time the gear is set) for 12 - 24 hours. Tiedown nets are set with the floatline tied to the leadline at 6-ft (1.8 m) intervals, so that the floatline is close to the bottom and the net forms a limp bag between each tie. They are left in the water for 3-4 days, and are used to catch flounders and monkfish.

Individual sink/anchor gillnets which are about 295 ft. (90 m) long. They are usually fished as a series of 5 - 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 66 lbs/net (30 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 Northeast groundfish, gillnets are tended daily to semiweekly (NEFSC 2002c).

6.1.6.3 Fish Traps and Pots

Fish traps, pots, and lobster pots are similar. To help differentiate, the following descriptions are given. A non-lobster trap could be a trap that is configured with small mesh or small entrances that effectively exclude lobsters, or a floating trap that is fished off the bottom. If a fish pot or trap is configured in such a way that it is not capable of catching lobster, then NMFS would not consider it to be a lobster trap, and the vessel would not be subject to the lobster trap gear specifications. NMFS has determined that the floating Norwegian fish pots are not lobster traps.

The Norwegian design pots are collapsible two-chamber rectangular pots made of netting, with a single bridle with anchor along the short end of the pot, allowing it to float and to turn with the current, adapted from Furevik et al. (2008). They have one entrance at the opposite end as the bridle, and are made of 50 mm black poly mesh for the trap body and 50 mm white poly for the entrances (into the pot and between chambers). Three frames per pot were constructed of 2 cm diam. PVC electrical conduit, with 13 cm radius corners, glued with cement. The frame sizes were approx. 1.5 m x 1 m (4.79 ft x 3.28 ft), hung 0.7 m (2.3 ft) apart forming two chambers with a widemouth entrance in between. The bridles were anchored with >5 kg links of chain. The PVC pipes were then perforated and 11 deep-water gillnet floats were added along the upper frame to achieve proper orientation. During the tank investigation, the top of the Norwegian pot was measured to be 3 m off bottom; the bottom of the pot was 1.5 m off-bottom.

6.1.6.4 Hook and Line Gear

6.1.6.4.1 Hand Lines/Rod and Reel

Fishermen use hand lines as well as rods and reels in the Northeast Region to catch a variety of demersal species. Handlines are the simplest form of hook and line fishing. It 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. The sinkers vary from stones to cast lead. The hooks can vary from single to multiple arrangements in “umbrella” rigs. Fishermen use an attraction device such as natural bait or an artificial lure with the hook. Handlines can be carried by currents until retrieved or fished in such a manner as to hit bottom and bounce (Stevenson, et al. 2004).

6.1.6.4.2 Mechanized Line Fishing

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

Fishermen use jigging machines to jerk a line with several unbaited hooks up in the water to attract a fish. Fishermen generally use fish jigging machine lines in waters up to 1,970 ft. (600 m) deep. Hooks and sinkers can contact the bottom. Depending upon the way the gear is used, it may catch a variety of demersal species.

6.1.6.4.3 Bottom Long Lines

Sectors would also use bottom longlines. This gear consists of a long length of line 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 1,476 ft. (450 m) and are deployed with 20 - 24 lbs (9 - 11 kg) anchors. The mainline is a parachute cord. Gangions are typically 16 in (40 cm) long and 3 - 6 in (1 - 1.8 m) apart and are made of shrimp twine. These bottom longlines are usually set for a few hours at a time (NEFSC 2002c).

All hooks must be 12/0 circle hooks. A “circle hook is a hook with the point turned back towards the shank. 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. Habitat impacts from bottom long lines are negligible.

6.1.6.5 Gear Interaction with Habitat

Commercial fishing in the region has historically used trawls, gillnets, and bottom longline gear. Fishermen have intensively used trawls throughout the region for decades and currently account for the majority of commercial fishing activity in the multispecies fishery off New England.

The most recent Multispecies FMP action to include a comprehensive evaluation of gear effects on habitat was Amendment 13 (NEFMC 2003). Amendment 13 described the general effects of bottom trawls on benthic marine habitats. This analysis primarily used an advisory report prepared for the International Council for the Exploration of the Seas (ICES 2000). This report identified a number of possible effects of bottom otter trawls on benthic habitats and is based on scientific findings summarized in Lindeboom and de Groot (1998). The report focuses on the Irish Sea and North Sea, but assesses effects in other areas. The report generally concluded that: (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). The report also concluded the following about direct habitat effects:

- Loss or dispersal of physical features such as peat banks or boulder reefs results in changes that are always permanent and lead to an overall change in habitat diversity. This 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 results in changes that may be permanent leading to an overall change in habitat diversity. This in turn leads to the local loss of species and species assemblages dependent on such biogenic features;

- Changes are not likely to be permanent due to a 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; and
- Changes are not likely to be permanent due to alteration of the detailed physical features of the seafloor by reshaping seabed features such as sand ripples or damaging burrows and associated structures that provide important habitats for smaller animals and can be used by fish to reduce their energy requirements.

The Committee on Ecosystem Effects of Fishing for the National Research Council's Ocean Studies Board (NRC 2002) also prepared evaluation of the habitat effects of trawling and dredging that was evaluated during Amendment 13. Trawl gears evaluated included bottom otter 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.

The report from a "Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern U.S." sponsored by the NEFMC and MAFMC (NEFSC 2002c) provides additional information for various Northeast region gear types. A panel of 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:

- Evaluating the existing scientific research on the effects of fishing gear on benthic habitats;
- Determining the degree of impact from various gear types on benthic habitats in the Northeast;
- Specifying the type of evidence that is available to support the conclusions made about the degree of impact;
- Ranking the relative importance of gear impacts to various habitat types; and
- 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 bottom 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.

The panel's report provides additional information 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 for the panel to rank these three substrates in terms of their vulnerability to the effects of bottom trawling. The report also notes that other factors such as frequency of disturbance from fishing and from natural events are also important. In general, the panel determined that impacts from trawling are greater in gravel/rock habitats with attached epifauna. The panel ranked impacts to biological structure higher than impacts to physical structure. Effects of trawls on major physical features in mud (deep water clay-bottom habitats) and gravel bottom were described as permanent. 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 bottom longlines on sand and gravel habitats would result in low degree impacts (NEFSC 2002c). 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 bottom longlines on sand would not be expected.

Morgan and Chuenpagdee (2003) evaluated the habitat effects of ten 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 the Exploration of the Seas and National Research Council reports, the panel did not evaluate individual types of trawls and dredges. The impacts of bottom gillnets, traps, and bottom longlines were limited to warm or shallow water environments with rooted aquatic vegetation or "live bottom" environments (e.g., coral reefs).

The Omnibus Essential Fish Habitat Amendment 2 (OA2) is evaluating existing habitat management areas and develop new habitat management areas. To assist with this effort, the Habitat PDT developed an analytical approach to characterize and map habitats and to assess the extent to which different habitat types are vulnerable to different types of fishing activities. This body of work, termed the Swept Area Seabed Impact approach, includes a quantitative, spatially-referenced model that overlays fishing activities on habitat through time to estimate both potential and realized adverse effects to EFH. The approach is detailed in this document, available on the Council webpage: http://www.nefmc.org/habitat/sasi_info/110121_SASI_Document.pdf.

The spatial domain of the SASI model is U.S. Federal waters (3-200 nm offshore) from Cape Hatteras to the U.S.-Canada border. Within this region, habitats were defined based on natural disturbance regime and dominant substrate. Understanding natural disturbance regime is important because it may mask or interact with human-caused disturbance. Energy at the seabed was inferred from an oceanography model (flow) and a coastal relief model (depth) and was binned into areas of high or low energy. Substrate type is an important determinant of habitat because it influences the distribution of managed species, structure-forming epifauna, and prey species by providing spatially discrete resources such as media for burrowing organisms, attachment points for vertical epifauna, etc. The dominant substrate map was composed of thousands of visual and grab-sample observations, with grid size based on the spacing of the observations. The underlying spatial resolution of the substrate grid is much higher on Georges Bank and on the tops of banks and ledges in the Gulf of Maine than it is in deeper waters. For this reason, additional data sources were used during habitat management area development.

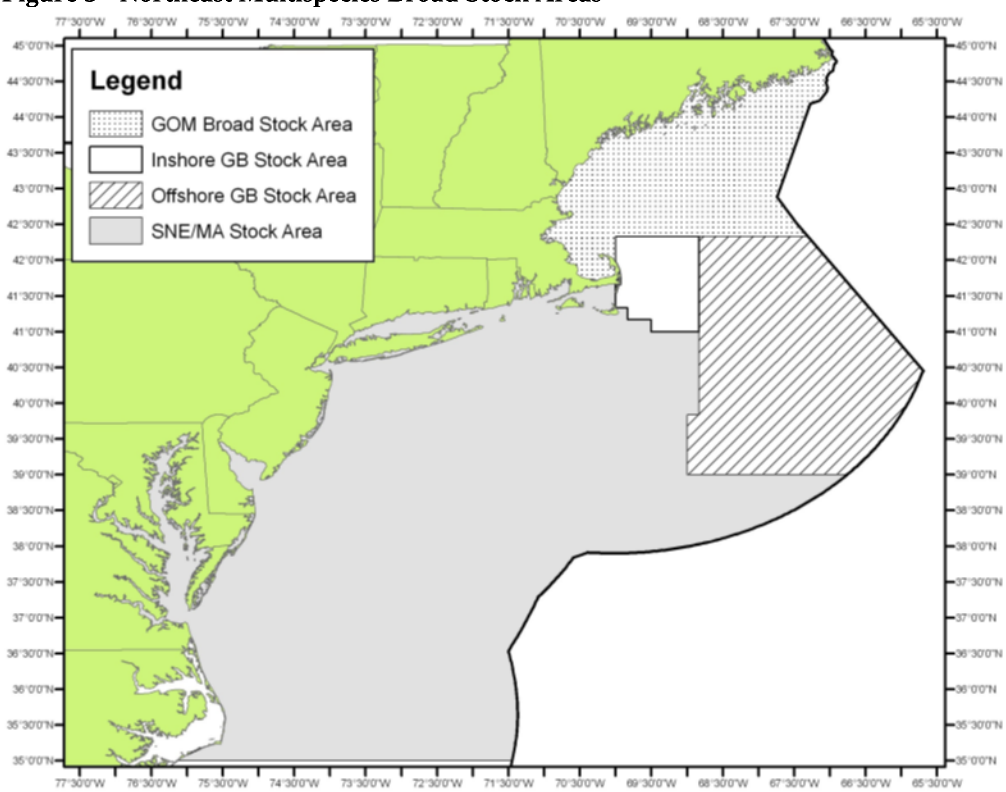
One of the outputs of the model is habitat vulnerability, which is related in part to the characteristics of the habitat itself, and part to the quality of the impact. Because of a general need for attachment sites, epifauna that provided a sheltering function for managed species tend to be more diverse and abundant in habitats containing larger grain sized substrates. Structurally complex and/or long-lived epifaunal species are more susceptible to gear damage and slower to recover. Recovery rates were assumed to be retarded in low energy areas, such that overall vulnerability (susceptibility + recovery) of low energy areas is greater than high energy areas, other factors being equal. When combined with the underlying substrate and energy distribution, the susceptibility and recovery scores assigned to the inferred mix of epifaunal and geological features generated a highly patchy vulnerability map. Locations where high proportions by area map out as cobble-dominated or cobble- and boulder-dominated tended to show higher vulnerability scores. Although the literature on fixed gear impacts is relatively sparse, it was estimated that mobile gears have a greater per-unit area swept impact than fixed gears, so mobile gear vulnerability scores are the focus here in the exemption area analyses below.

6.2 Regulated Groundfish Species

This section describes the life history and stock population status for each allocated fish stocks harvested under the Northeast Multispecies FMP. Figure 5 identifies the four broad stock areas used in the fishery. Further information on life history and habitat characteristics of the stocks managed in this FMP can be found in the Essential Fish Habitat Source Documents at http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

The allocated target stocks for the Northeast Multispecies FMP are: GOM Cod, GB Cod, GOM Haddock, GB Haddock, American Plaice, Witch Flounder, SNE/MA Winter Flounder, GOM Winter Flounder, GB Winter Flounder, Cape Cod/GOM Yellowtail Flounder, GB Yellowtail Flounder, SNE/MA Yellowtail Flounder, Redfish, Pollock and White Hake.

Figure 5 - Northeast Multispecies Broad Stock Areas



The Northeast Multispecies FMP also manages Atlantic halibut, ocean pout, windowpane flounder, and wolffish. While OFLs, ABCs, and ACLs are specified for these stocks, they were not allocated to sectors through Amendment 16. These species are discussed in Section 6.2.

The following discussions have been adapted from the most recent stock assessment reports (NEFSC 2015). Table 16 summarizes the status of the northeast groundfish stocks as of the most recent operational assessments, noting which groundfish stocks are overfished or are experiencing overfishing.

Table 16 - Status of Northeast Groundfish stocks for FY2015

Stock	Previous Assessment Overfishing?	Previous Assessment Overfished?	**2015 Assessments** Overfishing?	**2015 Assessments** Overfished?
Georges Bank Cod	Yes	Yes	Unknown	Yes
Gulf of Maine Cod	Yes	Yes	Yes	Yes
Georges Bank Haddock	No	No	No	No
Gulf of Maine Haddock	No	No	No	No
Georges Bank Yellowtail Flounder	Unknown	Unknown	Unknown	Unknown
Southern New England/Mid-Atlantic Yellowtail Flounder	No	No	Yes	Yes
Cape Cod/Gulf of Maine Yellowtail Flounder	Yes	Yes	Yes	Yes
American Plaice	No	No	No	No
Witch Flounder	Yes	Yes	Yes	Yes
Georges Bank Winter Flounder	No	No	Yes	Yes
Gulf of Maine Winter Flounder	No	Unknown	No	Unknown
Southern New England/Mid-Atlantic Winter Flounder	No	Yes	No	Yes
Acadian Redfish	No	No	No	No
White Hake	No	No	No	No
Pollock	No	No	No	No
Northern Windowpane Flounder	Yes	Yes	No	Yes
Southern Windowpane Flounder	No	No	No	No
Ocean Pout	No	Yes	No	Yes
Atlantic Halibut	No	Yes	Unknown	Yes
Atlantic Wolffish	No	Yes	No	Yes

6.2.1 Gulf of Maine Cod

Life History. The Atlantic cod, *Gadus morhua*, is a demersal gadoid species found on both sides of the North Atlantic. In the western North Atlantic, cod occur from Greenland to North Carolina. In U.S. waters, cod are assessed and managed as two stocks: Gulf of Maine (GOM) and Georges Bank (GB). GOM cod attain sexual maturity at a later age than GB cod due to different growth rates between the two stocks. The greatest concentrations of cod off the U.S. Northeast coast are on rough bottoms 33 - 492 ft (10 - 150 m) deep and at 32 - 50°F (0 - 10°C). Spawning occurs year-round near the ocean bottom, with a peak in winter and spring. Peak spawning corresponds to 41 - 45°F (5 - 7°C) water. It is delayed until spring when winters are severe, and peaks in the winter when winters are mild. Eggs are pelagic, buoyant, spherical, and transparent. They drift for 2 - 3 weeks before hatching. The larvae are pelagic for about three months until reaching 1.6 - 2.3 in (4 - 6 cm), when they descend to the seafloor. Most remain on the bottom, and there is no evidence of a subsequent diel, vertical migration. Adults tend to move in schools, usually near the bottom, but also occur in the water column (NEFSC 2011c).

Population Status. The inshore GOM stock appears to be relatively distinct from the offshore cod stocks on the banks of the Scotian Shelf and Georges Bank based on tagging studies. GOM cod spawning stock biomass is estimated to have been just over 22,000 mt in 1982. After a period of decline in the 1980's, SSB returned to roughly 20,000 mt in 1990 before decreasing again in the 1990's. The use of separate assessment models (M=.2 and M-ramp) in the last three assessments yield two estimates for SSB in recent years, though both indicate a sharp decline in SSB since 2010. The stock remains low relative to historic levels and is subject to a formal stock rebuilding plan. The 2014 SSB biomass estimates (M=.2 and M-ramp models) 6% and 4% (respectively) of the biomass target. Currently, the GOM cod stock is overfished and overfishing is occurring (NEFSC 2015).

6.2.2 Georges Bank Cod

Life History. Georges Bank cod, *Gadus morhua*, is the most southerly cod stock in the world. The greatest concentrations off the Northeast coast of the U.S. are on rough bottoms in waters between 33 and 492 ft (10 - 150 m) and at temperatures between 32 and 50° F (0 - 10°C). Spawning occurs year-round, near the ocean bottom, with a peak in winter and spring. Peak spawning corresponds to water temperatures between 41 and 45°F (5 - 7°C). It is delayed until spring when winters are severe, and peaks in the winter when winters are mild. Eggs are pelagic, buoyant, spherical, and transparent. They drift for 2 to 3 weeks before hatching. The larvae are pelagic for about 3 months until reaching 1.6 to 2.3 in (4 - 6 cm), at which point they descend to the seafloor. Afterwards, most remain on the bottom, and there is no evidence of a subsequent diel, vertical migration. Adults tend to move in schools, usually near the bottom, but also occur in the water column (NEFSC 2011c).

Population Status. GB cod is a transboundary stock co-managed by the U.S. and Canada. The GB cod stock underwent a benchmark assessment in 2012 (SAW55, NEFSC 2013a), which indicated that the stock is overfished and overfishing is occurring. The 2015 peer review concluded that the GB cod model was not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based an alternative approach. The update to the ASAP model was rejected, not the underlying benchmark formulation from SAW 55. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined.Overfishing status is considered unknown and the peer review concluded that evidence suggests that this stocks should still be considered overfished.

6.2.3 Gulf of Maine Haddock

Life History. Gulf of Maine haddock, *Melanogrammus aeglefinus*, is a demersal gadoid species found in the North Atlantic Ocean, occurring from Cape May, New Jersey to the Strait of Belle Isle, Newfoundland. Six distinct haddock stocks have been identified, and the two which occur in U.S. waters are associated with Georges Bank and the Gulf of Maine. Haddock are highly fecund broadcast spawners, spawning over various substrates including rocks, gravel, smooth sand, and mud. In the Gulf of Maine, spawning occurs from early February to May, usually peaking in February to April. Haddock release their eggs near the ocean bottom in batches where a courting male then fertilizes them. Fertilized eggs become buoyant and rise to the surface water layer and remain in the water column to development. Larvae metamorphose into juveniles in roughly 30 to 42 days at lengths of 0.8 to 1.1 in (2 - 3 cm). Juveniles initially live in the epipelagic zone and remain in the upper water column for 3 - 5 months, but they visit the seafloor in search of food. They settle into a demersal existence once they locate suitable habitat. Haddock do not make extensive migrations, but prefer deeper waters in the winter and tend to move shoreward in summer. The GOM haddock have lower weights at age than the GB stock and the age at 50% maturity was also lower for GOM haddock than GB haddock (NEFSC 2011c).

Population Status. The GOM haddock underwent a benchmark assessment in 2014 at SAW 59, which indicated that the stock was not overfished, and overfishing was not occurring. The 2013 SSB was estimated at 4,153 mt, above the <2,452 mt overfishing threshold, a change from the 2012 assessment update when the stock was experiencing overfishing (NEFSC 2014). As of the 2015 groundfish operational assessments, the stock is not overfished and overfishing is not occurring, with SSB estimated to be at 223% of the biomass target (NEFSC 2015).

6.2.4 Georges Bank Haddock

Life History. The life history of GB haddock, *Melanogrammus aeglefinus*, is comparable to the GOM haddock (Section 6.2.3). On Georges Bank, spawning occurs from January to June, usually peaking from February to early-April. This is the principal haddock spawning area in the Northeast U.S. Shelf Ecosystem, concentrating on the northeast peak of Georges Bank. Median age and size of maturity differ slightly between the GB and GOM haddock stocks (NEFSC 2011c).

Population Status. The GB haddock stock is a transboundary stock co-managed by the U.S. and Canada. The stock is not overfished and overfishing is not occurring (NEFSC 2015). The fishing mortality rate for this stock has been low in recent years. There has been a steady increase in SSB from ~15,000 mt in the early 1990s, to about 252,000 mt in 2007. The dramatic increase 2005 - 2007 is due to the exceptionally large 2003 year class reaching maturity. From 2007 - 2010, SSB decreased 35% as that 2003 year class decreased due to natural and fishing mortality. The fishing mortality rate for this stock has been low in recent years. Substantial declines have recently occurred in the weights at age due to slower than average growth. This was particularly true of the 2003 year-class. This decline is affecting productivity in the short-term. The growth of subsequent year-classes is returning to the earlier rates (NEFSC 2012b).

6.2.5 American Plaice

Life History. American plaice, *Hippoglossoides platessoides*, is an arctic-boreal to temperate-marine pleuronectid (righteye) flounder that inhabits the continental shelves of the North Atlantic. Off the U.S. coast, American plaice are managed as a single stock in the Gulf of Maine and Georges Bank regions. American plaice are batch spawners, releasing eggs in batches every few days over the spawning period. Adults spawn and fertilize their eggs at or near the bottom. Buoyant eggs lack oil globules and drift into the upper water column. Eggs hatch at the surface and the time between fertilization and hatching varies with water temperature. Transformation of the larvae and migration of the left eye begins when the larvae are ~0.8 in (20 mm). Dramatic physiological transformations occur during the juvenile stage; the body shape flattens and widens. As the migration of the left eye across the top of the head to the right side reaches completion, descent towards the seafloor begins. In U.S. and Canadian waters, adult American plaice are sedentary, migrating only for spawning and feeding (NEFSC 2011c).

Population Status. In the Gulf of Maine and Georges Bank, the American plaice is not overfished and overfishing is not occurring (NEFSC 2015). The NEFMC adopted a revised rebuilding strategy through FW 51, which would rebuild the stock in 10 years with a 50 percent (median) probability of success by 2024 (NEFMC 2014).

6.2.6 Witch Flounder

Life History. Witch flounder, *Glyptocephalus cynoglossus*, is a demersal flatfish distributed on both sides of the North Atlantic. In the western North Atlantic, the species ranges from Labrador southward, and closely associates with mud or sand-mud bottom. In U.S. waters, witch flounder are common throughout the Gulf of Maine, in deeper areas on and adjacent to Georges Bank, and along the shelf edge as far south as Cape Hatteras, North Carolina. Witch flounder is managed as a unit stock. Spawning occurs at or near the bottom; however, the buoyant eggs rise into the water column where subsequent egg and larval development occurs. The pelagic stage of witch flounder is the longest among the species of the family *Pleuronectidae*. Descent to the bottom occurs when metamorphosis is complete, at 4 - 12 months of age. There has been a decrease in both the age and size of sexual maturity in recent years. Witch flounder spawn from March to November, with peak spawning occurring in summer. The general trend is for spawning to occur progressively later from south to north. In the Gulf of Maine-Georges Bank region, spawning occurs from April to November, and peaks from May to August. Spawning occurs in dense aggregations that are associated with areas of cold water. Witch flounder spawn at 32 - 50 °F (0 – 10 °C) (NEFSC 2011c).

Population Status. Witch flounder are overfished and overfishing is occurring as of the 2015 groundfish operational assessments (NEFSC 2015). The spawning stock biomass was estimated to be 2,077 mt, 22% of the SSB_{MSY} proxy. The 2014 fully selected fishing mortality was estimated to be 0.687, which is 246% of the F_{MSY} proxy (NEFSC 2015). Total catch has declined in recent years and is below the time series average. Spawning stock biomass has shown a general declining trend over the time series (NEFSC 2015).

6.2.7 Gulf of Maine Winter Flounder

Life History. Winter flounder, *Psuedopleuronectes americanus,* is a demersal flatfish distributed in the western North Atlantic from Labrador to Georgia. Important U.S. commercial and recreational fisheries exist from the Gulf of Maine to the Mid-Atlantic Bight. Winter flounder is managed and assessed in U.S. waters as three stocks: Gulf of Maine, southern New England/Mid-Atlantic, and Georges Bank. Adult GOM winter flounder migrate inshore in the fall and early winter and spawn in late winter and early spring. Peak spawning occurs in Massachusetts Bay and south of Cape Cod during February and March, and somewhat later along the coast of Maine, continuing into May. After spawning, adults typically leave inshore areas when water temperatures exceed 59°F (15oC), although some remain inshore year-round. Winter flounder eggs are demersal, adhesive, and cluster together. Larvae are initially planktonic, but 5 - 6 weeks after hatching become increasingly bottom-oriented with metamorphosis, as the left eye migrates to the right side of the body and the larvae become “flounder-like.” This finishes by the time the larvae are 0.3 - 0.4 in (8 - 9 mm) long at ~8 weeks old. Newly metamorphosed young-of-the-year winter flounder reside in shallow water where individuals may grow to ~4 in (100 mm) within the first year (NEFSC 2011c).

Population Status. Gulf of Maine winter flounder is not overfished, and overfishing is unknown (NEFSC 2015). The overfished status remains unknown because a biomass reference point or proxy cannot be determined without an assessment model, and an analytical assessment model has not been accepted since the last benchmark (NEFSC 2015). In the absence of an assessment model, an area-swept empirical approach is used to estimate the abundance of 30+ cm biomass based on state and federal surveys (NEFSC 2015).

6.2.8 Georges Bank Winter Flounder

Life History: The life history of Georges Bank winter flounder, *Psuedopleuronectes americanus*, is comparable to the the Gulf of Maine winter flounder life history, which is described in section 6.2.7.

Population Status: Based on the 2015 operational assessment, the Georges Bank winter flounder stock is overfished and overfishing is occurring. The 2014 spawning stock biomass was estimated to be at 43% of SSB_{MSY} (NEFSC 2015).

6.2.9 Southern New England/Mid-Atlantic Winter Flounder

Life History: The life history of SNE/MA winter flounder, *Psuedopleuronectes americanus*, is comparable to the the Gulf of Maine winter flounder life history, which is described in section 6.2.7.

Population Status: Based on the 2015 operational assessment, the SNE/MA winter flounder stock is overfished but overfishing is not occurring. The 2014 spawning stock biomass was estimated to be at 23% of SSB_{MSY} (NEFSC 2015).

6.2.10 Cape Cod/Gulf of Maine Yellowtail Flounder

Life History: The yellowtail flounder, *Limanda ferruginea*, is a demersal flatfish that occurs from Labrador to Chesapeake Bay. It generally inhabits depths between 131 to 230 ft. (40 and 70 m). NMFS manages three stocks off the U.S. coast including the Cape Cod/GOM, GB, and SNE/MA stocks. Spawning occurs in the western North Atlantic from March through August at temperatures of 41 to 54 °F (5 to 12°C). Spawning takes place along continental shelf waters northwest of Cape Cod. Yellowtail flounder spawn buoyant, spherical, pelagic eggs that lack an oil globule. Pelagic larvae are brief residents in the water column with transformation to the juvenile stage occurring at 0.5 to 0.6 in (11.6 to 16 mm) standard length. There are high concentrations of adults around Cape Cod in both spring and autumn. The median age at maturity for females is 2.6 years off Cape Cod.

Population Status: Based on the 2015 operational assessment, the CC/GOM yellowtail flounder stock is overfished and overfishing is occurring. The 2014 spawning stock biomass was estimated to be at 16% of the biomass target (NEFSC 2015).

6.2.11 Georges Bank Yellowtail Flounder

Life History: The general life history of the GB yellowtail flounder, *Limanda ferruginea*, is comparable to the Cape Cod/GOM yellowtail described in section 6.2.10. The median age at maturity for females is 1.8 years on Georges Bank. Spawning takes place along continental shelf.

Population Status: The Georges Banks yellowtail flounder stock status is unknown due to a lack of biological reference points. Stock condition is poor (NEFSC 2015).

6.2.12 Southern New England/Mid-Atlantic Yellowtail Flounder

Life History: The general life history of the SNE/MA yellowtail flounder, *Limanda ferruginea*, is comparable to the Cape Cod/GOM yellowtail described in section 6.2.10. The median age at maturity for females is 1.6 years in southern New England.

Population: Based on the 2015 operational assessment, the SNE/MA yellowtail flounder stock is overfished and overfishing is occurring. The 2014 spawning stock biomass was estimated to be at 26% of the biomass target (NEFSC 2015).

6.2.13 Acadian Redfish

Life History: The Acadian redfish, *Sebastes fasciatus Storer*, and the deepwater redfish, *S. mentella Travin*, are virtually indistinguishable from each other based on external characteristics. Deepwater redfish are less prominent in the more southerly regions of the Scotian Shelf and appear to be virtually absent from the Gulf of Maine. Conversely, Acadian redfish appear to be the sole representative of the genus Sebastes. NMFS manages Acadian redfish inhabiting the U.S. waters of the Gulf of Maine and deeper portions of Georges Bank and the Great South Channel as a unit stock.

The redfish are a slow growing, long-lived, ovoviviparous species with an extremely low natural mortality rate. Redfish fertilize their eggs internally. The eggs develop into larvae within the oviduct, and are released near the end of the yolk sac phase. The release of larvae lasts for 3 to 4 months with a peak in late May to early June. Newly spawned larvae occur in the upper 10 m of the water column; at 0.4 to 1.0 in (10 to 25 mm). The post-larvae descend below the thermocline when about 1 in (25 mm) in length. Young-of-the-year are pelagic until reaching 1.6 to 2.0 in (40 to 50 mm) at 4 to 5 months old. Therefore, young-of-the-year typically move to the bottom by early fall of their first year. Redfish of 9 in (22 cm) or greater are considered adults. In general, the size of landed redfish positively correlates with depth. This may be due to a combination of differential growth rates of stocks, confused species identification (deepwater redfish are a larger species), size-specific migration, or gender-specific migration (females are larger). Redfish make diurnal vertical migrations linked to their primary euphausiid prey.

Population Status: Based on the 2015 operational assessment, the redfish stock is not overfished and overfishing is not occurring. The retrospective adjusted spawning stock biomass in 2014 was estimated to be 117% of the biomass target (NEFSC 2015).

6.2.14 Pollock

Life History: Pollock, *Pollachius virens*, occur on both sides of the North Atlantic. In the western North Atlantic, the species is most abundant on the western Scotian Shelf and in the Gulf of Maine. There is considerable movement of pollock between the Scotian Shelf, Georges Bank, and the Gulf of Maine. Although some differences in meristic and morphometric characters exist, there are no significant genetic differences among areas. As a result, pollock are assessed as a single unit. The principal pollock spawning sites in the western North Atlantic are in the western Gulf of Maine, Great South Channel, Georges Bank, and on the Scotian Shelf. Spawning takes place from September to April. Spawning time is more variable in northern sites than in southern sites. Spawning occurs over hard, stony, or rocky bottom. Spawning activity begins when the water column cools to near 46 °F (8°C) and peaks when temperatures are approximately 40 to 43 °F (4.5 to 6°C). Thus, most spawning occurs within a comparatively narrow range of temperatures.

Pollock eggs are buoyant and rise into the water column after fertilization. The pelagic larval stage lasts for 3 to 4 months. At this time the small juveniles or "harbor pollock" migrate inshore to inhabit rocky subtidal and intertidal zones. Pollock then undergo a series of inshore-offshore movements linked to temperature until near the end of their second year. At this point, the juveniles move offshore where the pollock remain throughout the adult stage. Pollock are a schooling species and occur throughout the water column. With the exception of short migrations due to temperature changes and north-south movements for spawning, adult pollock are fairly stationary in the Gulf of Maine and along the Nova Scotian coast. Male pollock reach sexual maturity at a larger size and older age than females.

Population Status: Based on the 2015 operational assessment, the pollock stock is not overfished and overfishing is not occurring (NEFSC 2015).

6.2.15 White Hake

Life History: The white hake, *Urophycis tenuis*, occurs from Newfoundland to southern New England and is common on muddy bottom throughout the Gulf of Maine. The depth distribution of white hake varies by age and season. Juvenile white hake typically occupy shallower areas than adults, but individuals of all ages tend to move inshore or shoalward in summer and disperse to deeper areas in winter. The northern spawning group of white hake spawns in late summer (August-September) in the southern Gulf of St. Lawrence and on the Scotian Shelf. The timing and extent of spawning in the Georges Bank - Middle Atlantic spawning group has not been clearly determined. The eggs, larvae, and early juveniles are pelagic. Older juvenile and adult white hake are demersal. The eggs are buoyant.

Pelagic juveniles become demersal at 2.0 to 2.4 in (50 - 60 mm) total length. The pelagic juvenile stage lasts about two months. White hake attain a maximum length of 53 in (135 cm) and weigh up to 49 lbs (22 kg). Female white hake are larger than males (NEFSC 2013b).

Population Status: Based on the 2015 operational assessment, the pollock stock is not overfished and overfishing is not occurring (NEFSC 2015). The white hake stock is estimated to be at 88% of the biomass target.

6.2.16 Gulf of Maine/Georges Bank Windownpane Flounder

Life History: Windowpane flounder or sand flounder, *Scophthalmus aquosus*, is a left-eyed, flatfish species that occurs in the northwest Atlantic from the Gulf of St. Lawrence to Florida (Collette & Klein-MacPhee 2002). Windowpane prefer sandy bottom habitats and occur at depths from the high water mark to 656 ft (200 m), with the greatest abundance at depths < 180 ft (55 m), and at temperatures of 32º-80ºF (0º-26.8ºC) (Moore 1947). On Georges Bank, it is most abundant at depths < 60 m during late spring through autumn but overwintering occurs in deeper waters to 366 m (Chang et al. 1999). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB or northern) and Southern New England-Mid-Atlantic Bight (SNE/MA or southern) due to differences in growth rates, size at maturity, and relative abundance trends. Windowpane generally reach sexual maturity between ages 3 and 4 (Moore 1947), though males can mature at age 2 (Grosslein & Azarovitz 1982). On Georges Bank, median length at maturity is nearly the same for males (8.7 in, 22.2 cm) and females (8.9 in, 22.5 cm) (O'Brien et al. 1993). Spawning occurs on Georges bank during July and August and peaks again between October and November at temperatures of 55º- 61ºF (13º-16ºC) (Morse & Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (Collette & Klein-MacPhee 2002). During the first year of life, spring-spawned fish have significantly faster growth rates than autumn-spawned fish, which may result in differential natural mortality rates between the two cohorts (Neuman et al. 2001). Young windowpanes settle inshore and then move offshore to deeper waters as they grow. Windowpane on Georges Bank aggregate in shallow water during summer and early fall and move offshore in the winter and early spring (Grosslein & Azarovitz 1982).

Population Status: Based on the 2015 operational assessment, the northern windowpane flounder stock is overfished but overfishing is not occurring (NEFSC 2015).

6.2.17 Southern New England/Mid-Atlantic Windownpane Flounder

Life History: The life history of Southern New-England/Mid-Atlantic Bight (southern) windowpane flounder, *Scophthalmus aquosus*, is comparable to Northern Windowpane Flounder (Section 6.2.16). In Southern New England, median length at maturity is nearly the same for males (8.5 in, 21.5 cm) and females (8.3 in, 21.2 cm) (O'Brien, et al. 1993). A split spawning season occurs between Virginia and Long Island with peaks in spring and fall (Chang, et al. 1999). Spawning occurs in the southern Mid-Atlantic during April and May and then peaks again in October or November (Morse & Able 1995).

Population Status: Based on the 2015 operational assessment, the southern windowpane flounder stock is not overfished and overfishing is not occurring (NEFSC 2015).

6.2.18 Ocean Pout

Life History: Ocean pout, *Zoarces americanus*, is a demersal eel-like species found in the northwest Atlantic from Labrador to Delaware. Ocean pout are most common on sand and gravel bottom (Orach-Meza 1975) at depths of 49-262 ft (15-80 m) and temperatures of 43º-48º F (6º-9º C) (Scott 1982). In US waters, ocean pout are assessed and managed as a unit stock from the Gulf of Maine to Delaware. In the Gulf of Maine, median length at maturity for males and females is 11.9 in (30.3 cm) and 10.3in (26.2 cm), respectively. Median length at maturity for males and females from Southern New England is 12.6 in (31.9 cm) and 12.3in (31.3 cm), respectively (O'Brien, et al. 1993). According to tagging studies conducted in Southern New England, ocean pout appear not to migrate, but do move between different substrates seasonally. In Southern New England-Georges Bank they occupy cooler rocky areas in summer, returning in late fall (Orach-Meza 1975). In the Gulf of Maine, they move out of inshore areas in the late summer and then return in the spring. Spawning occurs between September and October in Southern New England (Olsen & Merriman 1946) and in August and September in Newfoundland (Keats et al. 1985). Adults aggregate in rocky areas prior to spawning. Eggs are internally fertilized (Mercer et al. 1993; Yao & Crim 1995) and females lay egg masses encased in a gelatinous matrix that they then guard during the incubation period of 2.5-3 months (Keats, et al. 1985). Ocean pout hatch as juveniles on the bottom and are believed to remain there throughout their lives (Methven & Brown 1991; Yao & Crim 1995).

Population Status: Based on the 2015 operational assessment, ocean pout is overfished but overfishing is not occurring (NEFSC 2015).

6.2.19 Atlantic Halibut

Life History: Atlantic halibut, *Hippoglossus hippoglossus*, is the largest species of flatfish in the northwest Atlantic Ocean. This long-lived, late-maturing flatfish is distributed from Labrador to southern New England (Collette & Klein-MacPhee 2002). They prefer sand, gravel, or clay substrates at depths up to 1000 m (Miller et al. 1991; Scott & Scott 1988). Along the coastal Gulf of Maine, halibut move to deeper water in winter and shallower water in summer (Collette & Klein-MacPhee 2002). Atlantic halibut reach sexual maturity between 5 to 15 years and the median female age of maturity in the Gulf of Maine-Georges Bank region is 7 years (Sigourney et al. 2006). In general, Atlantic halibut spawn once per year in synchronous groups during late winter through early spring (Neilson et al. 1993) and females can produce up to 7 million eggs per year depending on size (Haug & Gulliksen 1988). Spawning is believed to occur in waters of the upper continental slope at depths below 200 m (Scott & Scott 1988). Halibut eggs are buoyant but drift suspended at water depths of 54 - 90 m (Taning 1936). Incubation times are 13 - 20 days depending on temperature (Blaxter et al. 1983); how long halibut live in the plankton after hatching is not known.

Population Status: The stock assessment model framework for Atlantic halibut was not accepted as best scientific advice by the review panel at the 2015 operational assessments (NEFSC 2015). The 2010 benchmark assessment and 2012 assessment update concluded that the stock was overfished and that was overfishing was occurring. All information available in the 2015 assessment update, including the long-term exploitation history of the stock and survey trends, indicate that stock size has not increased, and that the condition of the stock is still poor. The 2015 peer review concluded that the halibut model was not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based an alternative approach. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined. Overfishing status is considered unknown for halibut and the peer review concluded that evidence suggests that this stocks should still be considered overfished.

6.2.20 Atlantic Wolffish

Life History: Atlantic wolffish, *Anarhichas lupus*, is a benthic fish distributed on both sides of the North Atlantic Ocean. In the northwest Atlantic, the species occurs from Davis Straits off of Greenland to Cape

Cod and sometimes in southern New England and New Jersey waters (Collette & Klein-MacPhee 2002). In the Georges Bank-Gulf of Maine region, abundance is highest in the southwestern portion at depths of 263 - 394 ft (80 - 120 m), but wolffish are also found in waters from 131 - 787 ft (40 - 240 m) (Nelson & Ross 1992) and at temperatures of 29.7º - 50.4º F (-1.3º - 10.2º C) (Collette & Klein-MacPhee 2002). They prefer complex benthic habitats with large stones and rocks (Pavlov & Novikov 1993). Atlantic wolffish are mostly sedentary and solitary, except during mating season. There is some evidence of a weak seasonal shift in depth between shallow water in spring and deeper water in fall (Nelson & Ross 1992). Most individuals mature by age 5-6 when they reach ~18.5 in (47 cm) total length (Nelson & Ross 1992; Templeman 1986). Northern wolffish mature at smaller sizes than faster growing southern fish. Peak spawning is believed to occur from September to October for Gulf of Maine-Georges Bank wolffish (Collette & Klein-MacPhee 2002), though laboratory studies have shown that wolffish can spawn most of the year (Pavlov & Moksness 1994). Eggs are laid in masses, and males are thought to brood for several months. Incubation time is dependent on water temperature and may be 3 - 9 months. Larvae and early juveniles are pelagic between 20 - 40 mm TL, with settlement beginning by 50 mm TL (Falk-Petersen & Hansen 1991).

Population Status: Based on the 2015 operational assessment, Atlantic wolfish is overfished but overfishing is not occurring (NEFSC 2015).

6.3 Non-Groundfish Species

6.3.1 Spiny Dogfish

Life History. Spiny dogfish, *Squalus acanthias*, occurs in the western North Atlantic from Labrador to Florida. Spiny dogfish is 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. They 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 18 – 22 months, and produce 2 - 15 pups (average of 6). Size at maturity for females is ~31 in (80 cm), but can vary from 31 - 33 in (78 - 85 cm) depending on the abundance of females (NEFSC 2013h).

Population and Management Status. The NEFMC and MAFMC jointly manage spiny dogfish FMP for federal waters and the Atlantic States Marine Fisheries Commission (ASMFC) has a state waters plan. Spawning stock biomass of spiny dogfish declined rapidly in response to a directed fishery during the 1990's. NFMS initially implemented management measures for spiny dogfish in 2001. These measures have been effective in reducing landings and fishing mortality. At the 2010 TRAC, managers agreed to determine stock status using the model from SAW 43 (2006) and NEFSC spring survey data through 2009. The stock is not presently overfished and overfishing is not occurring. NMFS declared the spiny dogfish stock rebuilt for the purposes of federal management in May 2010 (TRAC 2010). As of the 2015 update, the stock remains rebuild, is not overfished and overfishing is not occurring (Rago & Sosbee, 2015).

6.3.2 Skates

Life History. There are seven species in the Northeast Region skate complex: little skate (*Leucoraja erinacea*), winter skate (*L. ocellata*), barndoor skate (*Dipturus laevis*), thorny skate (*Amblyraja radiata*), smooth skate (*Malacoraja senta*), clearnose skate (*Raja eglanteria*), and rosette skate (*L. garmani*). Barndoor skate is the most common skate in the Gulf of Maine, on Georges Bank, and in southern New England. Georges Bank and southern New England is the center of distribution for little and winter skates in the Northeast Region. Thorny and smooth skates typically occur in the Gulf of Maine. Clearnose and rosette skates have a more southern distribution, and occur primarily in southern New England and the Chesapeake Bight. Skates are not known to undertake large-scale migrations, but move seasonally with changing water temperature; they move offshore in summer and early autumn and then return inshore during winter and spring. Skates lay eggs enclosed in a hard, leathery case commonly called a mermaid's purse. Incubation time is 6 - 12 months, with the young having the adult form at the time of hatching. Catches of these species are largely interrelated with the NE multispecies, monkfish, and scallop fisheries (NEFSC 2011c).

Population and Management Status. NMFS implemented the Northeast Skate Complex Fishery Management Plan (Skate FMP) in September 2003. The FMP required both dealers and vessels to report skate landings by species. Framework Adjustment 2 modified the VTR and dealer reporting codes to further improve species specific landing reports. Possession prohibitions of barndoor, thorny, and smooth skates in the Gulf of Maine were also provisions of the FMP. The FMP implemented a trip limit of 10,000 lbs (4,536 kg) for winter skate, and required fishermen to obtain a Letter of Authorization to exceed trip limits for the little skate bait fishery. In 2010, Amendment 3 to the Skate FMP implemented a rebuilding plan for smooth skate and established an ACL and annual catch target for the skate complex, total allowable landings for the skate wing and bait fisheries, and seasonal quotas for the bait fishery. Possession limits were reduced, in-season possession limit triggers were implemented, as well as other measures to improve management of the skate fisheries. Due to insufficient information about the population dynamics of skates, there remains considerable uncertainty about the status of skate stocks.

Based on NEFSC bottom trawl survey data through autumn 2014/spring 2015, one skate species remained overfished (thorny) and overfishing was not occurring in any of the seven skate species. Recent skate landings have fluctuated between approximately 30 and 40 million pounds. The landings and catch limits proposed by Amendment 3 have an acceptable probability of promoting biomass growth and achieving the rebuilding (biomass) targets for thorny skates. Modest reductions in landings and a stabilization of total catch below the median relative exploitation ratio should cause skate biomass and future yield to increase.

6.3.3 Monkfish

Life History. Monkfish, *Lophius americanus*, (i.e., “goosefish”), occur in the western North Atlantic from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina. Monkfish occur from inshore areas to depths of at least 2,953 ft (900 m). Monkfish undergo seasonal onshore-offshore migrations, which may relate to spawning or possibly to food availability. Female monkfish begin to mature at age 4 with 50% of females maturing by age 5 (~17 in [43 cm]). Males generally mature at slightly younger ages and smaller sizes (50% maturity at age 4.2 or 14 in [36 cm]). Spawning takes place from spring through early autumn. It progresses from south to north, with most spawning occurring during the spring and early summer. Females lay a buoyant egg raft or veil that can be as large as 39 ft (12 m) long and 5 ft (1.5 m) wide, and only a few mm thick. The larvae hatch after 1 - 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 ~3 in (8 cm; NEFSC 2011c).

Population and Management Status. NMFS implemented the Monkfish FMP in 1999 (NEFMC 1998) and the fishery is jointly managed by the NEFMC and MAFMC. The FMP included measures to stop overfishing and rebuild the stocks through a number of measures. These measures included:

- 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;
- Mandatory time out of the fishery during the spawning season; and
- A framework adjustment process.

The Monkfish FMP defines two management areas for monkfish (northern and southern), divided roughly by an east-west line bisecting Georges Bank. As of 2013 data, monkfish in both management areas are not overfished and overfishing is not occurring (NEFSC 2013c).

6.3.4 Summer Flounder

Life History. Summer flounder, *Paralichthys dentatus*, occur in the western North Atlantic from the southern Gulf of Maine to South Carolina. Summer flounder are concentrated in bays and estuaries from late spring though early autumn, when an offshore migration to the outer continental shelf is undertaken. Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post larvae and juveniles occurs primarily within bays and estuarine areas. Most fish are sexually mature by age 2. Female summer flounder may live up to 20 years, but males rarely live for more than 10 years. Growth rates differ appreciably between the sexes with females attaining weights up to 11.8 kg (26 lbs.; NEFSC 2011c).

Population and Management Status. The FMP was developed by the MAFMC in 1988, and scup and black sea bass were later incorporated into the FMP. Amendment 2, implemented in 1993, established a commercial quota allocated to the states, a recreational harvest limit, minimum size limits, gear restrictions, permit and reporting requirements, and an annual review process to establish specifications for the coming fishing year. In 1999, Amendment 12 revised the overfishing definitions for all three species, established rebuilding programs, addressed bycatch and habitat issues and established a framework adjustment procedure for the FMP to allow for a streamlined process for relatively minor changes to management measures. As of the 2015 assessment update, the summer flounder stock was not overfished but overfishing was occurring in 2014 relative to the biological reference points from the SAW 57 benchmark assessment (Terceiro, 2015).

6.3.5 American Lobster

Life History. American lobster, *Homarus americanus*, occurs in continental shelf waters from Maine to North Carolina. There are three biological stock units: : the Gulf of Maine, Georges Bank, and Southern New England. The American lobster is long-lived and known to reach more than 40 pounds in body weight (Wolff 1978). Lobsters are encased in a hard exoskeleton that is periodically cast off (molted) for growth and mating to occur. Eggs are carried under the female's abdomen during a 9 - 12 month incubation period. Larger lobsters produce eggs with greater energy content and thus, may produce larvae with higher survival rates (Attard & Hudon 1987). Seasonal timing of egg extrusion and larval hatching is somewhat variable among areas and may also vary due to seasonal weather patterns. Hatching tends to occur over a four month period from May – September, occurring earlier and over a longer period in the southern part of the range. The pelagic larvae molt four times before they resemble adults and settle to the bottom. Lobsters molt more than 20 times over 5 - 8 years before they reach the minimum legal harvest size.

Population and Management Status. The states and NMFS cooperatively manage the American lobster resource through the ASMFC under the provisions of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). Inshore landings have increased steadily since the early 1970s. States have jurisdiction for implementing measures in state waters, while NMFS implements complementary regulations in federal waters. Fishing effort is intense and increasing throughout much of the range of the species. The majority of the landings are reportedly harvested from state waters. While each stock area has an inshore and offshore component, Gulf of Maine and Southern New England areas support predominantly inshore fisheries and the Georges Bank supports a predominantly offshore fishery.

The most recent 2009 Stock Assessment Report concluded that "(t)he American lobster fishery resource presents a mixed picture, with stable abundance for much of the Gulf of Maine stock, increasing abundance for the Georges Bank stock, and decreased abundance and recruitment yet continued high fishing mortality for the Southern New England stock" (ASMFC 2009). An updated benchmark formulation was used in 2015. This assessment combined the GOM and GB stocks into a single biological unit. The GOM/GB unit is not overfished and overfishing is not occurring, while the SNE stock is considered depleted but overfishing is not occurring (ASMFC, 2015).

6.3.6 Whiting (Silver Hake)

Life History. Silver hake, also known as whiting, *Merluccius bilinearis*, range primarily from Newfoundland to South Carolina. Silver hake are fast swimmers with sharp teeth, and are important fish predators that also feed heavily on crustaceans and squid (Lock & Packer 2004). In U.S. waters, two stocks have been identified based on differences of head and fin lengths (Almeida 1987), otolith morphometrics (Bolles & Begg 2000), otolith growth differences, and seasonal distribution patterns (Lock & Packer 2004). The northern silver hake stock inhabits Gulf of Maine - Northern Georges Bank waters, and the southern silver hake stock inhabits Southern Georges Bank - Middle Atlantic Bight waters. Silver hake migrate in response to seasonal changes in water temperatures, moving toward shallow, warmer waters in the spring. They spawn in these shallow waters during late spring and early summer and then return to deeper waters in the autumn (Brodziak et al. 2001). The older, larger silver hake especially prefer deeper waters. During the summer, portions of both stocks can be found on Georges Bank, whereas during the winter fish in the northern stock move to deep basins in the Gulf of Maine, while fish in the southern stock move to outer continental shelf and slope waters. Silver hake are widely distributed, and have been observed at temperature ranges of 2-17° C (36-63° F) and depth ranges of 11-500 m (36-1,640 ft). However, they are most commonly found between 7-10º C (45-50º F) (Lock & Packer 2004).

Population and Management Status. Due to their abundance and availability, silver hake have supported important U.S. and Canadian fisheries as well as distant-water fleets. Landings increased to 137,000 mt in 1973 and then declined sharply with increased restrictions on distant-water fleet effort and implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1977. U.S. landings during 1987-1996 were relatively stable, averaging 16,000 mt per year, but have gradually declined to a historic low of 6,800 mt in 2005.

The otter trawl remains the principal gear used in the U.S. fishery, and recreational catches have been low since 1985. Silver hake are managed under the NEFMC's Northeast Multispecies FMP ("non-regulated multispecies" category). In 2000, the NEFMC implemented Amendment 12 to this FMP, and placed silver hake into the “small mesh multispecies” management unit, along with red hake and offshore hake. This amendment established retention limits based on net mesh size, adopted overfishing definitions for northern and southern stocks, identified essential fish habitat for all life stages, and set requirements for fishing gear (NEFMC 2000). As of the last assessment in 2010, silver hake is not overfished and overfishing is not occurring in the northern or southern management area (NEFSC 2011a).

6.3.7 Loligo Squid

Life History. Longfin inshore squid (*Loligo pealeii*) are distributed primarily in continental shelf waters located between Newfoundland and the Gulf of Venezuela (Cohen 1976; Roper et al. 1984). In the northwest Atlantic Ocean, longfin squid are most abundant in the waters between Georges Bank and Cape Hatteras where the species is commercially exploited. The stock area extends from the Gulf of Maine to Cape Hatteras. Distribution varies seasonally. North of Cape Hatteras, squid migrate offshore during late autumn to overwinter in warmer waters along the shelf edge and slope, and then return inshore during the spring where they remain until late autumn (Jacobson 2005). The species lives for about nine months, grows rapidly, and spawns year-round with peaks during late spring and autumn. Individuals hatched in summer grow more rapidly than those hatched in winter and males grow faster and attain larger sizes than females (Brodziak & Macy III 1996).

Population and Management Status. The domestic fishery occurs primarily in Southern New England and Mid-Atlantic waters, but some fishing also occurs along the edge of Georges Bank. Fishing patterns reflect seasonal Loligo distribution patterns and effort is generally directed offshore during October through April and inshore during May through September. The fishery is dominated by small-mesh otter trawlers, but near-shore pound net and fish trap fisheries occur during spring and summer. Since 1984, annual offshore landings have generally been three-fold greater than inshore landings. The stock is managed by the MAFMC Council under the Atlantic Mackerel, Squid, and Butterfish FMP. Management measures for the L. pealeii stock include annual TACs, which have been partitioned into seasonal quotas since 2000 (trimesters in 2000 and quarterly thereafter), a moratorium on fishery permits, and a minimum codend mesh size of 1 7/8 inches. At the latest assessment in 2009, overfishing was not occurring, and the overfished status could not be determined as there is no biomass reference point (NEFSC 2011a).

6.3.8 Atlantic Sea Scallops

Life History. Sea scallops, *Placopecten magellanicus,* are distributed in the northwest Atlantic Ocean from Newfoundland to North Carolina, mainly on sand and gravel sediments where bottom temperatures remain below 20oC (68oF). North of Cape Cod, concentrations generally occur in shallow water <40 m (22 fathoms) deep. South of Cape Cod and on Georges Bank, sea scallops typically occur at depths 25 - 200 m (14 - 110 fathoms), with commercial concentrations generally 35 - 100 m (19 - 55 fathoms). Sea scallops are filter feeders, feeding primarily on phytoplankton, but also on microzooplankton and detritus (Hart & Chute 2004). Sea scallops grow rapidly during the first several years of life. Between ages 3 and 5, they commonly increase 50 - 80% in shell height and quadruple their meat weight. Sea scallops have been known to live more than 20 years. They usually become sexually mature at age 2, but individuals younger than age 4 probably contribute little to total egg production. Sexes are separate and fertilization is external. Spawning usually occurs in late summer and early autumn; spring spawning may also occur, especially in the Mid-Atlantic Bight. Sea scallops are highly fecund; a single large female can release hundreds of millions of eggs annually. Larvae remain in the water column for four to seven weeks before settling to the bottom. Sea scallops attain commercial size at about four to five years old, though historically, three year olds were often exploited. Sea scallops have a somewhat uncommon combination of life-history attributes: low mobility, rapid growth, and low natural mortality (NEFSC 2011c).

Population and Management Status. The commercial fishery for sea scallops is conducted year round, primarily using offshore New Bedford style scallop dredges. A small percentage of the fishery employs otter trawls, mostly in the Mid-Atlantic. The principal U.S. commercial fisheries are in the Mid-Atlantic (from Virginia to Long Island, New York) and on Georges Bank and neighboring areas, such as the Great South Channel and Nantucket Shoals. There is also a small, primarily inshore fishery for sea scallops in the Gulf of Maine. The NEFMC established the Scallop FMP in 1982. The scallop resource was last assessed in 2014, and it was not overfished, and overfishing was not occurring (NEFSC 2014).

6.3.9 Scup

The scup fishery is managed by the MAFMC. The primary commercial fishery management measure is a quota that is distributed to three trimester periods and to individual states. Other federal regulations include minimum mesh size, gear restricted areas, and a minimum fish size. States typically restrict harvest to their quota using seasons and trip limits. As of SAW 60, the scup stock was not overfished and overfishing was not occurring (NEFSC 2015b).

6.3.10 Atlantic Herring

The Atlantic Sea herring fishery is managed by the NEFMC. The fishery uses quotas by area and season. Prosecuted primarily by mid water trawls (single and paired) and purse seines, management measures include restrictions on the incidental catch of haddock and other regulated groundfish. Mid-water trawls are allowed access to the groundfish closed areas as an exempted fishery but their use of the areas is subject to numerous regulatory restrictions. As of the 2015 operational assessment report, Atlantic herring was not overfished and overfishing was not occurring (Deroba, 2015).

6.3.11 Bycatch

The MSA defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, including economic discards and regulatory discards. Fish released alive under a recreational catch and release fishery management program are not included. The MSA requires that, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided should both be minimized. To consider whether these objectives are being met, bycatch must be reported and assessed.

To this end, the MSA requires that a standardized reporting methodology assess the amount and type of bycatch occurring in a fishery. The primary tools used to report bycatch in the multispecies fishery are the Vessel Trip Report system (VTR) and the NEFSC Observer Program (NEFOP). Each federally permitted groundfish vessel is required to report discards and landings on every trip from each statistical area they fish in. The sea sampling/observer program places personnel on boats to observe and estimate the amount of discards on a haul-by-haul basis. More information on bycatch may be found at: http://www.greateratlantic.fisheries.noaa.gov/

6.4 Assemblages of Fish Species

Georges Bank and the Gulf of Maine have historically had high levels of fish production. Several studies have identified 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. The study identified depth and salinity as major physical influences explaining assemblage structure. Table 17 compares the six assemblages identified in Gabriel (1992) with the five assemblages from Overholtz and Tyler (1985). This EA considers these assemblages and relationships to be relatively consistent. Therefore, these descriptions generally describe the affected area. The assemblages include allocated target species, as well as non-allocated target species and bycatch. The terminology and definitions of habitat types in Table 17 vary slightly between the two studies. For further information on fish habitat relationships, see Table 14.

Table 17 - 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

6.5 Protected Species

6.5.1 Species Present in the Area

Numerous protected species inhabit the environment within the Northeast Multispecies FMP management unit (Table 18). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act of 1973 (ESA) and/or the Marine Mammal Protection Act of 1972 (MMPA).

Cusk, porbeagle shark, and thorny skate, a NMFS "candidate species" under the ESA, occurs in the affected environment of the multispecies fishery (Table 18). Candidate species are those petitioned species that NMFS is actively considering for listing as endangered or threatened under the ESA and also include those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. Once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result, cusk, porbeagle shark, and thorny skate, will not be discussed further in this and the following sections. However, for additional information on these species, please visit http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm

Table 18 - Species protected under the Endangered Species Act and/or Marine Mammal Protection Act that may occur in the operation area for the Northeast multispecies fishery

Species	Status	Potentially affected by this action?
Cetaceans		
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Yes
Humpback whale (*Megaptera novaeangliae*)	Endangered	Yes
Fin whale (*Balaenoptera physalus*)	Endangered	Yes
Sei whale (*Balaenoptera borealis*)	Endangered	Yes
Blue whale (*Balaenoptera musculus*)	Endangered	No
Sperm whale (*Physeter macrocephalus*	Endangered	No
Minke whale (*Balaenoptera acutorostrata*)	Protected	Yes
Pilot whale (*Globicephala spp.*)[1]	Protected	Yes
Risso's dolphin (*Grampus griseus*)	Protected	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected	Yes
Short Beaked Common dolphin (*Delphinus delphis*)[2]	Protected	Yes
Spotted dolphin (*Stenella frontalis*)	Protected	No
Bottlenose dolphin (*Tursiops truncatus*)[3]	Protected	Yes
Harbor porpoise (*Phocoena phocoena*)	Protected	Yes
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes

Green sea turtle (*Chelonia mydas*)[4]	Endangered[4]	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Thorny skate (*Amblyraja radiata*)	Candidate	Yes
Porbeagle shark (*Lamna nasus*)	Candidate	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected	Yes
Gray seal (*Halichoerus grypus*)	Protected	Yes
Harp seal (*Phoca groenlandicus*)	Protected	Yes
Hooded seal (*Cystophora cristata*)	Protected	Yes
Critical Habitat		
North Atlantic Right Whale[5]	ESA-listed	No
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA-listed	No

Notes:
[1] There are two species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*.
[2] Prior to 2008, this species was called "common dolphin."
[3] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins.
[4] 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. On March 23, 2015, a proposed rule was issued to remove the current range-wide listing and, in its place, list eight DPSs as threatened and three as endangered (80 FR 15272).
[5] Originally designated June 3, 1994 (59 FR 28805);

6.5.2 Species and Critical Habitat Not Likely Affected by the Proposed Action

Based on available information, it has been determined that this action is not likely to affect spotted dolphin, shortnose sturgeon, hawksbill sea turtles, blue whales, or sperm whales. Further, this action is not likely to adversely affect Atlantic salmon, the Northwest Atlantic Distinct Population Segment (DPS) of loggerhead or North Atlantic right whale critical habitats. This determination has been made because either the occurrence of the species is not known to overlap with the multispecies fishery and/or there have never been documented interactions between the species and the multispecies fishery. In the case of critical habitat, this determination has been made because either the habitat does not occur within the range of the multispecies fishery or the fishery will not affect the primary constituent elements of the critical habitat, and therefore, will result in the destruction or adverse modification of critical habitat.

6.5.3 Species Potentially Affected by the Proposed Action

The multispecies fishery may affect multiple protected species of cetacean, sea turtles, pinnipeds, and fish (Table 17). Of primary concern is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species. To understand the potential risk of an interaction, it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) records of protected species interaction with particular fishing gear types. Information on species occurrence in the affected environment of the multispecies fishery is presented in this section, while information on protected species interactions with fishery gear is presented in Section 6.4.4.

6.5.3.1 Sea Turtles

Status and Trends. Table 19 includes the four ESA listed species of sea turtles that occur in the affected environment of the multispecies fisheries. Three of the four species are considered hard-shelled turtles (i.e., green, loggerhead, and Kemp's ridley). Additional background information on the range-wide status of the other four species, as well as a description and life history of the species, can be found in a number of published documents, including sea turtle status reviews and biological reports (Conant et al. 2009; Hirth 1997; NMFS & USFWS 2007b; c; 2013; NOAA 2007; TEWG 1998; 2000; 2009), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS & USFWS 2008), leatherback sea turtle (NMFS & USFWS 1992) (NMFS and USFWS 1998a), Kemp's ridley sea turtle (NMFS & USFWS 2011), and green sea turtle (NMFS & USFWS 1991, NMFS and USFWS 1998b).

Table 19 - Sea turtle species found in the affected environment of the multispecies fishery

Species	Listed At	Status
Green[1]	Species Level	Endangered: Breeding populations in Florida and on the Pacific coast of Mexico Threatened: Other populations
Kemp's ridley	Species Level	Endangered
Loggerhead	Distinct Population Segment	Northwest Atlantic DPS: Threatened
Leatherback	Species Level	Endangered
Notes: [1]Green sea turtle status may change. On March 23, 2015, a proposed rule was issued to remove the current range-wide listing and, in its place, list eight DPSs as threatened and three as endangered (80 FR 15272).		

Occurrence and Distribution. The multispecies fishery occurs in waters north of 35°N, where sea turtles occur seasonally. A general overview of sea turtle occurrence and distribution in the continental shelf waters of the Northwest Atlantic Ocean is below to assist in understanding how the multispecies fishery overlaps in time and space with the occurrence of sea turtles.

Hard-shelled sea turtles

Distribution. In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill et al. 2008; Braun & Epperly 1996; Epperly, Braun & Chester 1995; Mitchell et al. 2003; Shoop & Kenney 1992; TEWG 2009). While hard-shelled turtles are most common south of Cape Cod, MA, they are known to occur in the Gulf of Maine (GOM). Loggerheads, the most common hard-shelled sea turtle in the GAR, feed as far north as southern Canada. Loggerheads have been observed in waters with surface temperatures of 7°C to 30°C, but water temperatures ≥11°C are most favorable (Epperly, Braun, Chester, et al. 1995; Shoop & Kenney 1992). Sea turtle presence in U.S. Atlantic waters is also influenced by water depth. While hard-shelled turtles occur in waters from the beach to beyond the continental shelf, they are most commonly found in neritic waters of the inner continental shelf (Braun-McNeill & Epperly 2004; Griffin et al. 2013; Hawkes et al. 2006; Hawkes et al. 2011; Mansfield et al. 2009; McClellan & Read 2007; Mitchell, et al. 2003; Morreale & Standora 2005).

Seasonality. Hard-shelled sea turtles occur year-round in waters off Cape Hatteras, North Carolina and south. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Braun-McNeill & Epperly 2004; Epperly, Braun & Chester 1995; Epperly, Braun, Chester, et al. 1995; Griffin, et al. 2013; Morreale & Standora 2005), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the GOM by September, but some remain in Mid-Atlantic and Northeast areas until late fall (i.e., November). By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further (Epperly, Braun, Chester, et al. 1995; Griffin, et al. 2013; Hawkes, et al. 2011; Shoop & Kenney 1992).

Leatherback sea turtles

Leatherback sea turtles also engage in routine migrations between northern temperate and tropical waters (Dodge et al. 2014; James et al. 2005; James et al. 2006; NMFS & USFWS 1992). Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf (Dodge, et al. 2014; Eckert et al. 2006; James, et al. 2005; Murphy et al. 2006). They have a greater tolerance for colder water than hard-shelled sea turtles. They are also found in more northern waters later in the year, with most leaving the Northwest Atlantic shelves by mid-November (Dodge, et al. 2014; James, et al. 2005; James, et al. 2006).

6.5.3.2 Large Cetaceans

Status and Trends. Table 20 indicated the species of large whales occurring in the affected area. For additional information on the biology, status, and distribution of each species, refer to: Waring et al. (2014), Waring et al. (2015), and NMFS (1991; 2005; 2010a; 2011; 2012).

Occurrence and Distribution. Right, humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean. In general, these species follow an annual pattern of migration between low latitude wintering/calving grounds (south of 35°N) and high latitude spring/summer foraging grounds (primarily north of 41°N) (NMFS 1991b; 2005b; 2010a; 2011; 2012; Waring, et al. 2014, Waring, et al. 2015). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Brown et al. 2002; Clapham et al. 1993; Cole et al. 2013; Khan et al. 2010; 2011; 2012; Khan et al. 2009; NOAA 2008; Swingle et al. 1993; Vu et al. 2012; Waring, et al. 2014; Waring, et al. 2015). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Baumgartner et al. 2003; Baumgartner & Mate 2003; Brown, et al. 2002; Kenney 2001; Kenney et al. 1986; Kenney et al. 1995; Mayo & Marx 1990; Payne et al. 1986; Payne et al. 1990; Schilling et al. 1992). These foraging areas are consistently returned to annually, and therefore, can be considered important, high use areas for whales.

Table 20 – Species of large whales occurring in the affected area

Species	Listed Under the ESA	Protected Under the MMPA	Minimum Population Size	Population Trend	MMPA Strategic Stock[1]
North Atlantic Right Whale	Yes-Endangered	Yes	465	positive and slowly accelerating	Yes
Humpback Whale	Yes-Endangered	Yes	823	positive	Yes
Fin Whale	Yes-Endangered	Yes	1,234	unknown	Yes
Sei Whale	Yes-Endangered	Yes	236	unknown	Yes
Minke Whale	No	Yes	16,199	unknown	No

[1]A strategic stock is defined under the MMPA as a marine mammal stock: for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.
Source: Waring, et al. (2015).

As the affected area of the multispecies fishery occurs in waters north of 35°N, and whales may be present in these waters throughout the year, the multispecies fishery and large whales are likely to co-occur in the affected area. To further assist in understanding how the multispecies fishery overlaps in time and space with the occurrence of large whales, Table 21 gives an overview of species occurrence and distribution in the continental shelf waters of the affected environment of the multispecies fishery. For additional information on the biology, status, and range wide distribution of each whale species, refer to: Waring et al. (2014), Waring et al. (2015), and NMFS (1991; 2005; 2010a; 2011; 2012).

Table 21 - Large cetacean occurance in the GOM, GB, SNE, and Mid-Atlantic sub-regions of the multispecies fishery

Species	Prevalence and Approximate Months of Occurrence
North Atlantic Right Whale	• Distributed throughout all continental shelf waters of the GOM, GB, and Mid-Atlantic (SNE included) throughout the year. • New England waters (GOM and GB regions): **Foraging Grounds**. Important foraging grounds include: › Cape Cod Bay (January-April); › Great South Channel (April-June) › western GOM (April-May and July-October); › northern edge of GB (May-July); › Jordan Basin (August-October); and › Wilkinson Basin (April-July) • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern calving grounds (primarily November-April). • Increasing evidence of wintering areas (approximately November – January) in: › Cape Cod Bay; › Jeffreys and Cashes Ledges; › Jordan Basin; and › Massachusetts Bay (e.g., Stellwagen Bank).
Humpback	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • New England waters (GOM and GB regions): **Foraging Grounds** (approximately March-November). • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern (West Indies) calving grounds. • Increasing evidence of wintering areas (for juveniles) in Mid-Atlantic (e.g., waters in the vicinity of Chesapeake and Delaware Bays; peak presence approximately January through March) and Southeastern coastal waters.
Fin	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB sub-regions throughout the year. • Mid-Atlantic waters: › Migratory pathway to/from northern (high latitude) foraging and southern (low latitude) calving grounds; › Possible offshore calving area (October-January)

Species	Prevalence and Approximate Months of Occurrence
	• New England/SNE waters (GOM, GB, and SNE regions): **Foraging Grounds** (greatest densities March-August; lower densities September-November). • Important foraging grounds include: > Massachusetts Bay (esp. Stellwagen Bank) > Great South Channel > waters off Cape Cod (~40-50 meter contour) > western GOM (esp. Jeffrey's Ledge) > Eastern perimeter of GB > Mid-shelf area off the east end of Long Island. • Evidence of wintering areas in mid-shelf areas east of New Jersey, Stellwagen Bank; and eastern perimeter of GB.
Sei	• Uncommon in shallow, inshore waters of the Mid-Atlantic (SNE included), GB, and GOM; however, occasional incursions during peak prey availability and abundance. • Primarily found in deep waters along the shelf edge, shelf break, and ocean basins between banks. • Spring through summer, found in greatest densities in offshore waters of the GOM and GB (eastern margin into the Northeast Channel area; along the southwestern edge in the area of Hydrographer Canyon).
Minke	• Widely distributed throughout continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB during the spring, summer and fall; however, spring through summer found in greatest densities in the GOM and GB.
***Sources*: NMFS 1991, 2005, 2010b, 2011, 2012; Hain *et al.* 1992; Payne 1984; Good 2008; McClellan et al. 2004; Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982; Payne *et al*.1990; Winn et al. 1986; Kenney et al. 1986, 1995; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; 50 CFR 224.105; CETAP 1982; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012; Baumgartner *et al*. 2011; Cole *et al*. 2013; Risch *et al*. 2013; Waring *et al*. 2014; Waring et al. 2015; 80 FR 9314 (February 20, 2015).	

6.5.3.3 Small Cetaceans

Status. Table 22 includes the species of small cetaceans (dolphins and porpoises) occurring in the affected area. For additional information on the biology, status, and range wide distribution of each small cetacean species, refer to Waring et al. (2014), and Waring et al. (2015).
Occurrence and Distribution. Small cetaceans are found throughout the waters of the Northwest Atlantic Ocean. In the affected area, they can be found throughout the year from Cape Hatteras, NC (35°N), to the Canadian border (Waring, et al. 2014, Waring, et al. 2015). Within this range; however, there are seasonal shifts in species distribution and abundance. As the affected area of the multispecies fishery occurs in

waters north of 35°N, and small cetaceans may be present in these waters throughout the year, the multispecies fisheries and small cetaceans are likely to co-occur.

Table 22 - Small cetaceans that occur in the affected environment of the multispecies fishery

Species	Listed Under the ESA	Protected Under the MMPA	Minimum Population Size	Population Trend	MMPA Strategic Stock
Atlantic White Sided Dolphin	No	Yes	30,403	unknown	No
Short-Finned Pilot Whale	No	Yes	15,913	unknown	No
Long-Finned Pilot Whale	No	Yes	19,930	unknown	No
Risso's Dolphin	No	Yes	12,619	unknown	No
Short Beaked Common Dolphin	No	Yes	112,531	unknown	No
Harbor Porpoise	No	Yes	61,415	unknown	No
Bottlenose Dolphin (*Western North Atlantic Offshore Stock*)	No	Yes	56,053	unknown	No
Bottlenose Dolphin (*Western North Atlantic Northern Migratory Coastal Stock*)	No	Yes	8,620	unknown	Yes[2]
Bottlenose Dolphin (*Western North Atlantic Southern Migratory Coastal Stock*)	No	Yes	6,326	unknown	Yes[3]

[1,2] Both northern and southern migratory coastal stocks of bottlenose dolphins are considered a strategic stock under the MMPA as both stocks are designated as depleted under the Act.
Source: Waring et al. (2014) and Waring et al. 2015.

To understand how the multispecies fishery overlaps in time and space with the occurrence of small cetaceans, an overview of species occurrence and distribution in the continental shelf waters of the affected environment of the multispecies fishery is in Table 23. Waring et al. (2014) has additional information on the biology, status, and range distribution of each species.

Table 23 - Small cetacean occurrence in the GOM, GB, SNE, and Mid-Atlantic sub-regions of the multispecies fishery

Species	Prevalence and Approximate Months of Occurrence (if known)
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 m) of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM sub-regions; however, most common in the SNE, GB, and GOM sub-regions (i.e., shelf waters from Hudson Canyon (~ 39°N) and into GB, Massachusetts Bay, and the GOM). • Seasonal shifts in distribution: ***January-May**: low densities found from GB to Jeffreys Ledge; ***June-September**: Large densities found from GB, through the GOM;

Species	Prevalence and Approximate Months of Occurrence (if known)
	*__October-December__: intermediate densities found from southern GB to southern GOM. • South of GB (SNE and Mid-Atlantic sub- regions), low densities found year round, with waters off Virginia and North Carolina representing southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily 100-2,000 m) of the Mid-Atlantic, SNE, and GB sub-regions (esp. in Oceanographer, Hydrographer, Block, and Hudson Canyons). • Occasionally found in the GOM. • Seasonal shift in distribution: *__January-May__: occur from Cape Hatteras, NC, to GB * **Mid-summer-autumn**: moves onto GB; *Peak abundance* found on GB in the autumn.
Risso's Dolphin	• Common in the continental shelf edge waters of the Mid-Atlantic, SNE, and GB sub-regions; rare in the GOM sub-region. • From approximately March-November: distributed along continental shelf edge from Cape Hatteras, NC, to GB. • From approximately December-February: distributed in continental shelf edge of the Mid-Atlantic (SNE and Mid-Atl. sub-regions).
Harbor Porpoise	• Distributed throughout the continental shelf waters (primarily in waters < 150 m) of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM sub-regions. • Seasonal shifts in distribution: *__July-September__: Concentrated in the northern GOM; low numbers can be found on GB. *__October-December__: widely dispersed in waters from NJ to Maine. *__January-March__: intermediate densities in waters off New Jersey to North Carolina (SNE and Mid-Atl sub-regions); low densities found in waters off New York to GOM. *__April-June__: widely dispersed from New Jersey to Maine
Bottlenose Dolphin	**Western North Atlantic Offshore Stock** • Spring-Summer: Primarily distributed along the outer continental shelf/edge-slope of the Mid-Atlantic, SNE, and GB sub-regions. • Winter: Distributed in waters south of 35°N **Western North Atlantic Northern Migratory Stock** • Summer (July-August): distributed from the coastal waters from the shoreline to approximately the 25-m isobaths between the Chesapeake Bay mouth and Long Island, New York (Mid-Atl and SNE sub-regions). • Winter (January-March): Distributed in coastal waters south of 35^{o}N. **<u>Western North Atlantic Southern Migratory Stock</u>** • Spring and Summer (April-August): Distributed along coastal waters from

Species	Prevalence and Approximate Months of Occurrence (if known)
	North Carolina to Virginia (Mid-Atl and SNE sub- regions). • Fall and Winter (October-March): Distributed in coastal waters south of 35°N.
Pilot Whales: Short- and Long-Finned	**<u>Short- Finned Pilot Whales</u>** • Primarily occur south of 40°N (Mid-Atl and SNE sub-regions); although low numbers have been found along the southern flank of GB, but no further than 41°N. • Distributed primarily in the continental shelf edge-slope waters of Mid-Atlantic and SNE sub-regions from approximately May through December, with individuals moving to more southern waters (i.e., 35°N and south) beginning in the fall. **<u>Long-Finned Pilot Whales</u>** • Range from 35°N to 44°N • Winter to early spring (approximately November through April): primarily distributed along the continental shelf edge-slope of the Mid-Atlantic, SNE, and GB sub-regions. • Late spring through fall (approximately May through October): movements and distribution shift onto/within GB, the Great South Channel, and the GOM. **<u>Area of Species Overlap:</u>** between 38°N and 40°N (Mid-Atl and SNE sub-regions)
Note: Information presented in table is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to the 2,000 m isobath. *Sources*: Waring et al. (1992; 2007; 2014; 2015); Payne and Heinemann (1993); Payne (1984); Jefferson et al. (2009).	

6.5.3.4 Pinnipeds

Status and Trends. Table 24 provides the species of pinnipeds that occur in the affected environment of the multispecies fishery. Waring et al. (2014) and Waring et al. (2015) has additional information.

Table 24 - Pinniped species that occur in the affected environment of the multispecies fishery

Species	Listed Under the ESA	Protected Under the MMPA	Minimum Population Size	Population Trend	MMPA Strategic Stock
Harbor Seal	No	Yes	66,884	Unknown	No
Gray Seal	No	Yes	Unknown for U.S. waters; total Canadian population = 331,000	Positive	No
Harp Seal	No	Yes	Unknown for U.S. waters; western North Atlantic stock = 7.1 M	Positive	No
Hooded Seal	No	Yes	Unknown for U.S. waters; North Atlantic stock ≥ 512,000	Unknown	No
Source: Waring et al. (2014) and Waring et al. (2015).					

Occurrence and Distribution. Pinnipeds are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. In the affected area, they are primarily found throughout the year or seasonally from New Jersey to Maine. However, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35°N) (Waring, et al. 2007; Waring, et al. 2014; Waring, et al. 2015). As the affected area of the multispecies fishery is in waters north of 35°N, and pinnipeds may be present in these waters year-round, the multispecies fishery and pinnipeds are likely to co-occur. A general overview of species occurrence and distribution in the affected environment of the multispecies fishery is in Table 25. For additional information, refer to Waring et al. (2007; 2014; Waring, et al. 2015).

Table 25 - Pinniped occurrence in the GOM, GB, SNE, and Mid-Atlantic sub-regions of the multispecies fishery

Species	Prevalence and Approximate Months of Occurrence (if known)
Harbor Seal	Primarily distributed in waters from NJ to ME; however, increasing evidence that their range is extending into waters as far south as Cape Hatteras, NC (35°N). *Seasonal distribution:* *__Year Round__: Waters of Maine *__September-May__: Waters from New England to New Jersey; potential for some animals to extend range into waters as far south as Cape Hatteras, NC.
Gray Seal	Distributed in waters from New Jersey to Maine *Seasonal distribution:* *__Year Round__: Waters from Maine to Massachusetts *__September-May__: Waters from Rhode Island to New Jersey
Harp Seal	Winter-Spring (approximately January-May): Waters from Maine to New Jersey.
Hooded Seal	Winter-Spring (approximately January-May): Waters of New England.
Sources: Waring et al. (2007, for hooded seals); Waring et al. (2014); Waring et al. (2015).	

6.5.3.5 Atlantic Sturgeon

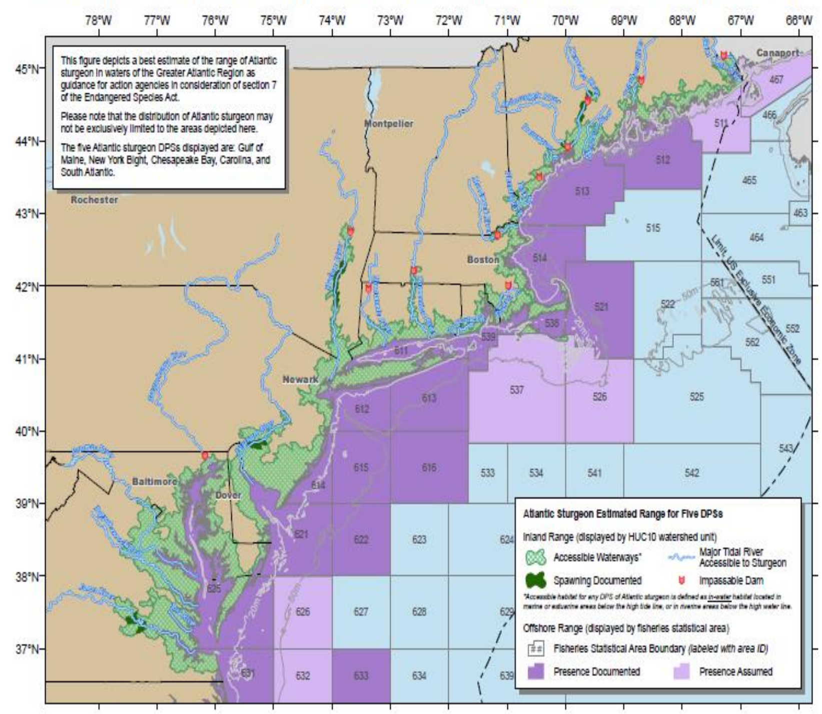
Status. Table 26 lists the 5 DPSs of Atlantic sturgeon likely to occur in the affected area. For additional information, refer to 77 FR 5880 and 77 FR 5914 (finalized February 6, 2012), as well as the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of Atlantic sturgeon (ASSRT 2007).

Table 26 - Atlantic sturgeon DPs listed under the ESA

Species	Listed Under the ESA
Gulf of Maine (GOM) DPS	Threatened
New York Bight (NYB) DPS	Endangered
Chesapeake Bay (CB) DPS	Endangered
Carolina DPS	Endangered
South Atlantic (SA) DPS	Endangered

Occurrence and Distribution. The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (Figure 6) (ASSRT 2007; Dadswell 2006; Dadswell et al. 1984; Dovel & Berggren 1983; Dunton et al. 2010; Erickson et al. 2011; Kynard et al. 2000; Laney et al. 2007; O'Leary et al. 2014; Stein et al. 2004b; Waldman et al. 2013; Wirgin et al. 2012b).

Figure 6 - Estimated range of Atlantic sturgeon distinct population segments



Based on fishery-independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 m depth contour (Dunton, et al. 2010; Erickson, et al. 2011; Stein et al. 2004a; Stein, et al. 2004b). However, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Collins & Smith 1997; Dunton, et al. 2010; Erickson, et al. 2011; Stein, et al. 2004a; b; Timoshkin 1968). Data from fishery-independent surveys and tagging and tracking studies also indicate that Atlantic sturgeon undertake seasonal movements along the coast. Tagging and tracking studies found that satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight, at depths >20 m, during winter and spring, while in the summer and fall, Atlantic sturgeon concentrations shifted to the northern portion of the Mid-Atlantic Bight at depths <20 m (Erickson, et al. 2011). A similar seasonal trend was found by Dunton et al. (2010); analysis of fishery-independent survey data indicated a coastwide distribution of Atlantic sturgeon during the spring and fall; a southerly (e.g., North Carolina, Virginia) distribution during the winters; and a centrally located (e.g., Long Island to Delaware) distribution during the summer. Although studies such as Erickson et al. (2011) and Dunton et al. (2010) provide some indication that Atlantic sturgeon are undertaking seasonal movements horizontally and vertically along the U.S. eastern coastline, there is no evidence to date that all Atlantic sturgeon make these seasonal movements. For instance, during inshore surveys conducted by the NEFSC in the GOM, Atlantic sturgeon have been caught in the fall, winter, and spring between the Saco and Kennebec Rivers (Dunton, et al. 2010).

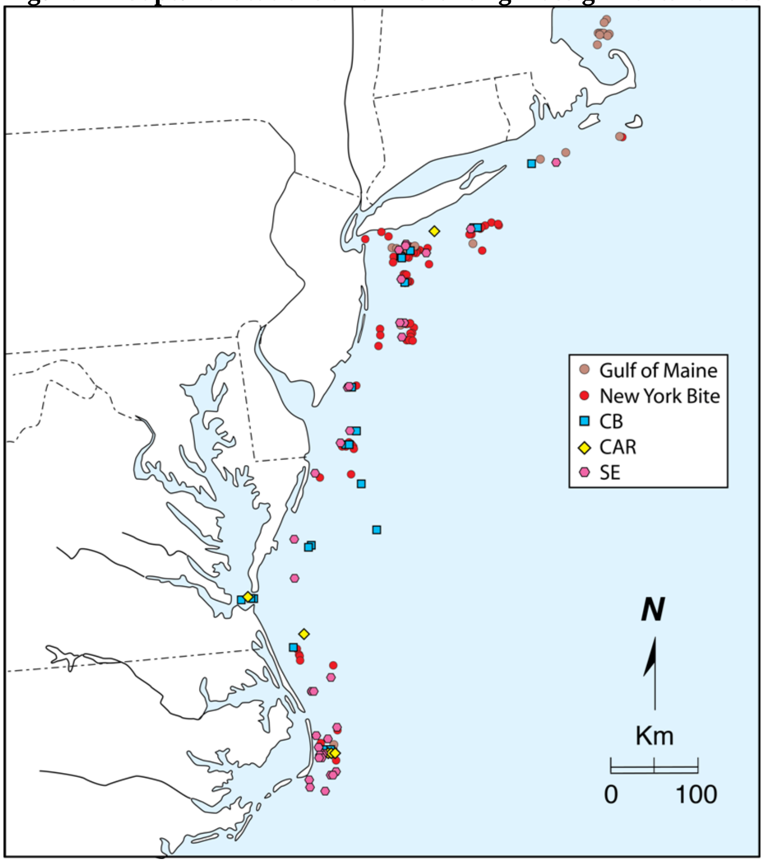
Within the marine range of Atlantic sturgeon, several marine aggregation areas have been identified adjacent to estuaries and/or coastal features formed by bay mouths and inlets along the U.S. eastern seaboard; depths in these areas are generally ≤25 m (Dunton, et al. 2010; Erickson, et al. 2011; Laney, et al. 2007; Stein, et al. 2004b). Although additional studies are still needed to clarify why these particular sites are chosen by Atlantic sturgeon, there is some indication that they may serve as thermal refuge, wintering sites, or marine foraging areas (Dunton, et al. 2010; Erickson, et al. 2011; Stein, et al. 2004b).

The following are the currently known marine aggregation sites located within the range of the multispecies fishery:

- Waters off North Carolina, including Virginia/North Carolina border (Laney, et al. 2007);
- Waters off the Chesapeake and Delaware Bays (Dunton, et al. 2010; Erickson, et al. 2011; Oliver et al. 2013; Stein, et al. 2004b);
- New York Bight (e.g., waters off Sandy Hook, New Jersey, and Rockaway Peninsula, New York; Dunton, et al. 2010; Erickson, et al. 2011; O'Leary, et al. 2014; Stein, et al. 2004b);
- Massachusetts Bay (Stein, et al. 2004b);
- Long Island Sound (Bain et al. 2000; Savoy & Pacileo 2003; Waldman, et al. 2013);
- Connecticut River Estuary (Waldman, et al. 2013);
- Kennebec River Estuary (termed a "hot spot" for Atlantic sturgeon by Dunton, et al. 2010).

In addition, since listing of the five Atlantic sturgeon DPSs, several genetic studies have occurred to address DPS distribution and composition in marine waters. Genetic analysis has been conducted on Atlantic sturgeon captured (fishery-independent) from aggregations in Long Island Sound and the Connecticut River (summer aggregations; Waldman, et al. 2013), as well as the New York Bight, specifically the coastal waters off the Rockaway Peninsula (spring and fall aggregations; O'Leary, et al. 2014). Results from these studies showed that these aggregations, regardless of location, were comprised of all five DPSs, with the NYB DPS consistently identified as the main contributor of the mixed aggregations, followed by the GOM, CB, SA, and Carolina DPSs. In a similar assessment, genetic analysis was conducted on Atlantic sturgeon captured (fishery-dependent) during the Northeast Fisheries Observer Program and At Sea Monitoring Program, which ranges from Maine to North Carolina. Results from this assessment affirmed that in waters of the Mid-Atlantic, all five DPSs co-occur (Figure 7), with the percentage of each DPS estimated to be as follows: 51% NYB DPS; 22% SA DPS; 13% CB DPS; 11% GOM DPS; 2% Carolina DPS; and 1% Canadian stock (Damon-Randall et al. 2013). However, these results have not been examined relative to the amount of observed fishing effort throughout the area. In a study by Wirgin et al. (2012b), genetic analysis revealed that the summer assemblage of Atlantic sturgeon in Minas Basin, Inner Bay of Fundy, Canada, was comprised not only of Canadian origin Atlantic sturgeon, but also Atlantic sturgeon from the GOM DPS (34-64% contribution to the mixed assemblage) and NYB DPS (1-2% contribution to the mixed assemblage). Although additional studies are needed to further clarify the DPS distribution and composition in non-natal estuaries and coastal locations, these studies provide some initial insight on DPS distribution and co-occurrence in particular areas along the U.S. eastern sea board.

Figure 7 - Capture locations and DPS of origin assignments for observer program specimens



Source: Map by Dr. Isaac Wirgin (Damon-Randall, et al. 2013).
Note: N=173

Based on the above studies and available information, as the affected area of the multispecies fishery occurs in waters north of 35^{o}N, and Atlantic sturgeon from any of the 5 DPSs may be present in these waters throughout the year, the multispecies fisheries and Atlantic sturgeon of the 5 DPSs are likely to co-occur in the affected area.

6.5.3.6 Atlantic Salmon (Gulf of Maine DPS)

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, while the marine range of the GOM DPS extends from the GOM (primarily northern portion of the GOM), to the coast of Greenland (Fay et al. 2006; NMFS & USFWS 2005). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay, et al. 2006; Hyvarinen et al. 2006; Lacroix & Knox 2005; Lacroix & McCurdy 1996; Lacroix et al. 2004; NMFS & USFWS 2005; Reddin 1985; Reddin & Friedland 1993; Reddin & Short 1991). For additional information on the on the biology, status, and range wide distribution of the GOM DPS of Atlantic salmon, refer to NMFS and USFWS (2005); Fay et al. (2006). Based on the above information, as the multispecies fishery operates throughout the year, and is known to operate in the GOM, it is possible that the fishery will overlap in time and space with Atlantic salmon migrating northeasterly between U.S. and Canadian waters.

6.5.4 Interactions Between Gear and Protected Species

Protected species described in Section 6.4.3 are all known to be vulnerable to interactions with various types of fishing gear. Available information on gear interactions with a given species (or species group) is in the sections below. These sections are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on those gear types that are known to pose the greatest risk to the species under consideration.

6.5.4.1 Marine Mammals

Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery. The categorization in the LOF determines whether participants in that fishery are subject to certain provisions of the MMPA such as registration, observer coverage, and take reduction plan requirements. Individuals fishing in Category I or II fisheries must comply with requirements of any applicable take reduction plan.
Categorization of fisheries is based on the following two-tiered, stock-specific approach:

- Tier 1 - considers the cumulative fishery mortality and serious injury for a particular stock. If the total annual mortality and serious injury rates within a stock resulting from all fisheries are ≤ 10% of the stock's potential biological removal rate (PBR), all fisheries associated with this stock fall into Category III. -If mortality and serious injury rates are >10% of PBR, the following Tier 2, analysis occurs.
- Tier 2 - considers fishery-specific mortality and serious injury for a particular stock. Specifically, this analysis compares fishery-specific annual mortality and serious injury rates to a stock's PBR to designate the fishery as a Category I, II, or III fishery (Table 27).

The following discussion on fishery interactions with marine mammals (large cetaceans, and small cetaceans and pinnipeds) use the Tier 2 classifications of fisheries (Table 27).

Table 27 - Descriptions of the Tier 2 fishery classification categories

Category	Level of incidental mortality or serious injury of marine mammals	Annual mortality and serious injury of a stock in a given fishery is…
Category I	frequent	≥50% of the PBR level
Category II	occasional	1% - 50% of the PBR level
Category III	remote likelihood, or no known	≤1% of the PBR level
Source: 50 CFR 229.2		

6.5.4.1.1 Large Cetaceans

Atlantic large whales are at risk of becoming entangled in fishing gear because the whales feed, travel and breed in many of the same ocean areas utilized for commercial fishing. The greatest entanglement risk to large whales is posed by fixed fishing gear (e.g., sink gillnet and trap/pot gear) comprised of lines (vertical or ground) that rise into the water column. Any line can become entangled in the mouth (baleen), flippers, and/or tail of the whale when the animal is transiting or foraging through the water column (Hartley et al. 2003; Johnson et al. 2005; Kenney 2001; NMFS 2014a; Waring, et al. 2014; Waring et al. 2015; Whittingham, Garon et al. 2005; Whittingham, Hartley, et al. 2005). For instance, in a study of

right and humpback whale entanglements, Johnson et al. (2005) attributed: 1) 89% of entanglement cases, where gear could be identified, to fixed gear consisting of pot and gillnets; and 2) entanglement of one or more body parts of large whales (e.g., mouth and/or tail regions) to four different types of line associated with fixed gear the buoy line, groundline, floatline, and surface system lines).[6] Although available data, such as Johnson et al. (2005), provide insight into large whale entanglement risks with fixed fishing gear, to date, due to uncertainties surrounding the nature of the entanglement event, as well as unknown biases associated with reporting effort and the lack of information about the types and amounts of gear being used, determining which part of fixed gear creates the most entanglement risk for large whales is difficult. As a result, any type or part of fixed gear is considered to create an entanglement risk to large whales and should be considered potentially dangerous to large whale species (Johnson, et al. 2005).
The effects of entanglement to large whales range from no injury to death (Angliss & DeMaster 1998; Johnson, et al. 2005; Moore & van der Hoop 2012; NMFS 2014a). "When… [whales] become fouled in gear, normal breathing and movement may be impaired or stopped completely. If the animal does manage to struggle free, portions of gear may remain attached to the body. This trailing gear, often made of durable synthetic material, may create excess drag, snag onto objects in the environment and impede normal behavior like breathing, feeding, movement, or breeding. Other effects include infections and deformations" (quote from Center for Coastal Studies, May 14, 2003, in Moore & van der Hoop 2012; NMFS 2014a). Considering these factors, the risk of injury or death in the event of an entanglement may depend on the characteristics of the whale involved (species, size, age, health, etc.), the nature of the gear (e.g., whether the gear incorporates weak links designed to help a whale free itself), human intervention (e.g., the feasibility or success of disentanglement efforts), or other variables (NMFS 2014a). Although the interrelationships among these factors are not fully understood, and the data needed to provide a more complete characterization of risk are not available, to date, available data do indicate that the entanglement in fishing gear is a significant source of serious injury or mortality for Atlantic large whales (Table 28) (Waring, et al. 2014; Waring et al. 2015).

Table 28 summarizes confirmed human-caused serious injury and mortality to humpback, fin, sei, minke, and North Atlantic right whales along the Gulf of Mexico Coast, U.S. East Coast, and Atlantic Canadian Provinces from 2009 to 2013 (Henry et al. 2015); the data provided in Table 28 is specific to confirmed serious injury or mortality to whales from entanglement in fishing gear. As many entanglement events go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, it is important to recognize that the information presented in Table 28 likely underestimates the rate of large whale serious injury and mortality due to entanglement. Further, scarring data suggests that entanglements may be occurring more frequently than the observed incidences indicate (i.e., Table 27; NMFS 2014). For instance, a study conducted by Robbins et al. (2009) analyzed entanglement scars observed in photographs taken during 2003-2006. This analysis suggests high rates of entanglements of GOM humpback whales in fishing gear. In an analysis of the scarification of right whales, 519 of 626 (82.9%) whales examined during 1980-2009 were scarred at least once by fishing gear (Knowlton et al. 2012). Further research using the North Atlantic Right Whale Catalogue has indicated that, annually, between 8.6% and 33.6% of right whales have been involved in entanglements (Knowlton et al. 2012). Based on this information, care should be taken when interpreting entanglement data as it is likely more incidences of entanglement are occurring than observation alone indicates.

[6] Buoy line connects the gear at the bottom to the surface system. Groundline in trap/pot gear connects traps/pots to each other to form trawls; in gillnet gear, groundline connects a gillnet or gillnet bridle to an anchor or buoy line. Floatline is the portion of gillnet gear from which the mesh portion of the net is hung. The surface system includes buoys and high-flyers, as well as the lines that connect these components to the buoy line.

Table 28 - Summary of confirmed serious injury or mortality to fin, minke, humpback, sei, and North Atlantic right whales from 2009-2013 due to fisheries entanglements.

Species	Total Confirmed Entanglement: Serious Injury	Total Confirmed Entanglement: Mortality	Entanglement Events: Total Annual Injury and Mortality Rate
North Atlantic Right Whale	12	6	3.4
Humpback Whale	33	8	8.4
Fin Whale	7	3	1.75
Sei Whale	0	0	0
Minke Whale	23	13	6.5

Notes:
[1]***Information presented in Table 27 is based on confirmed serious injury and mortality events along the Gulf of Mexico Coast, US East Coast, and Atlantic Canadian Provinces; it is not specific to US waters only.***

Sources**:** Henry *et al.* 2015; Waring *et al*. 2015.

Pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injurious and mortalities of marine mammals in each fishery. Large whales, in particular, humpback, fin, minke, and North Atlantic right whales, are known to interact with Category I and II fisheries in the (Northwest) Atlantic Ocean. As humpback, fin, and North Atlantic right whales are listed as endangered under the ESA, these species are considered strategic stocks under the MMPA. Section 118(f)(1) of the MMPA requires the preparation and implementation of a Take Reduction Plan (TRP) for any strategic marine mammal stock that interacts with Category I or II fisheries. In response to its obligations under the MMPA, in 1996, NMFS established the Atlantic Large Whale Take Reduction Team (ALWTRT) to develop a plan (Atlantic Large Whale Take Reduction Plan (ALWTRP or Plan)) to reduce serious injury to, or mortality of large whales, specifically, humpback, fin, and North Atlantic right whales, due to incidental entanglement in U.S. commercial fishing gear.[7] In 1997, the ALWTRP was implemented; however, since 1997, the Plan has been modified as NMFS and the ALWTRT learn more about why whales become entangled and how fishing practices might be modified to reduce the risk of entanglement. In fact, two recent adjustments include the Sinking Groundline Rule (72 FR 57104, October 5, 2007;), and the Vertical Line Rule (79 FR 36586, June 27, 2014; 79 FR 73848, December 12, 2014; 80 FR 14345, March 19, 2015; 80 FR 30367, May 28, 2015).[8]

The Plan consists of regulatory (e.g., universal gear requirements, modifications, and requirements; area- and season- specific gear modification requirements and restrictions; time/area closures) and non-

[7] The measures identified in the ALWTRP are also beneficial to the survival of the minke whale, which are also known to be incidentally taken in commercial fishing gear.
[8] The most recent Vertical Line Rule focused on trap/pot vertical line reduction as the ALWTRT determined that gillnets represent <1% of the total vertical lines on the east coast and that the impacts from this gear on large whales is minimal (Appendix 3A, NMFS 2014a); however, even with the new Rule, gear will still be subject to existing restrictions under the ALWTRP for gillnet gear.

regulatory measures (e.g., gear research and development, disentanglement, education and outreach) that, in combination, seek to assist in the recovery of North Atlantic right, humpback, and fin whales by addressing and mitigating the risk of entanglement in gear employed by commercial fisheries, specifically trap/pot and gillnet fisheries (http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/; 73 FR 51228; 79 FR 36586; 79 FR 73848; 80 FR 14345; 80 FR 30367). Specifically, the Plan identifies gear modification requirements and restrictions for Category I and II gillnet and trap/pot fisheries in the Northeast, Mid-Atlantic, and Southeast regions of the U.S.; these fisheries must comply with all regulations of the Plan.[9]

Table 29 has the specified gear modification requirements and restrictions under the ALWTRP for trap/pot or gillnet fisheries in the Northeast or Mid-Atlantic region of the U.S. As the affected environment of the proposed action will not extend into the Southeast region, those provisions of the Plan will not be discussed further. Details on the gear modification requirements and restrictions under the ALWTRP are at: http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

Except for the universal gear requirements, the additional gear modification requirements and restrictions identified in Table 30will vary by location (i.e., management areas) and dates. Table 29 and Table 30 provide the Management Areas recognized by the ALWTRP in the Northeast and Mid-Atlantic. Details on the specific gear modification requirements and restrictions in each Management Area are at http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

[9] The fisheries currently regulated under the ALWTRP include: Northeast/Mid-Atlantic American lobster trap/pot; Atlantic blue crab trap/pot; Atlantic mixed species trap/pot; Northeast sink gillnet; Northeast anchored float gillnet; Northeast drift gillnet; Mid-Atlantic gillnet; Southeastern U.S. Atlantic shark gillnet; and Southeast Atlantic gillnet (NMFS 2014a).

Table 29 - Summary of gear modification requirements and restrictions for the Northeast and Mid-Atlantic trap/pot and gillnet fisheries under the Atlantic Large Whale Take Reduction Plan

Fishery	Gear Modification Requirement and Restrictions
Trap/Pot	**Northeast and Mid-Atlantic** • Trap/Pot Universal (including sinking groundline), Weak Link, and Gear Marking Requirements **Northeast** • Minimum Number of Traps per Trawl Requirement • Seasonal Closure Areas
Gillnet	**Northeast and Mid-Atlantic** • Gillnet Universal Requirements (including sinking groundline) • Gillnet Gear Marking Requirements • Gillnet Weak Link Requirements • Seasonal Closure Areas • Anchored Gillnet Anchoring Requirements • Drift Gillnet Night Fishing & Storage Restrictions

Table 30 - Northeast and Mid-Atlantic Gillnet or Trap/Pot Management Areas under the Atlantic Large Whale Take Reduction Plan

Fishery	Management Areas
Northeast Trap/Pot	• Northern Inshore State Trap/Pot Waters • Massachusetts Restricted Area • Stellwagen Bank/Jeffreys Ledge Restricted Area • Great South Channel Restricted Trap/Pot Area • Northern & Southern Nearshore Trap/Pot Waters • Offshore Trap/Pot Waters • Jeffreys Ledge Gear Marking Area • Jordan Basin Gear Marking Area
Northeast Gillnet	• Cape Cod Bay Restricted Area • Stellwagen Bank/Jeffreys Ledge Restricted Area • Great South Channel Restricted Gillnet Area • Other Northeast Gillnet Waters • Jeffreys Ledge Gear Marking Area • Jordan Basin Gear Marking Area
Mid-Atlantic Trap/Pot	• Southern Nearshore Trap/Pot Waters • Offshore Trap/Pot Waters
Mid-Atlantic Gillnet	• Other Northeast Gillnet Waters • Mid/South Atlantic Gillnet Waters

Figure 8 - Trap/Pot Management Area under Atlantic Large Whale Take Reduction Plan

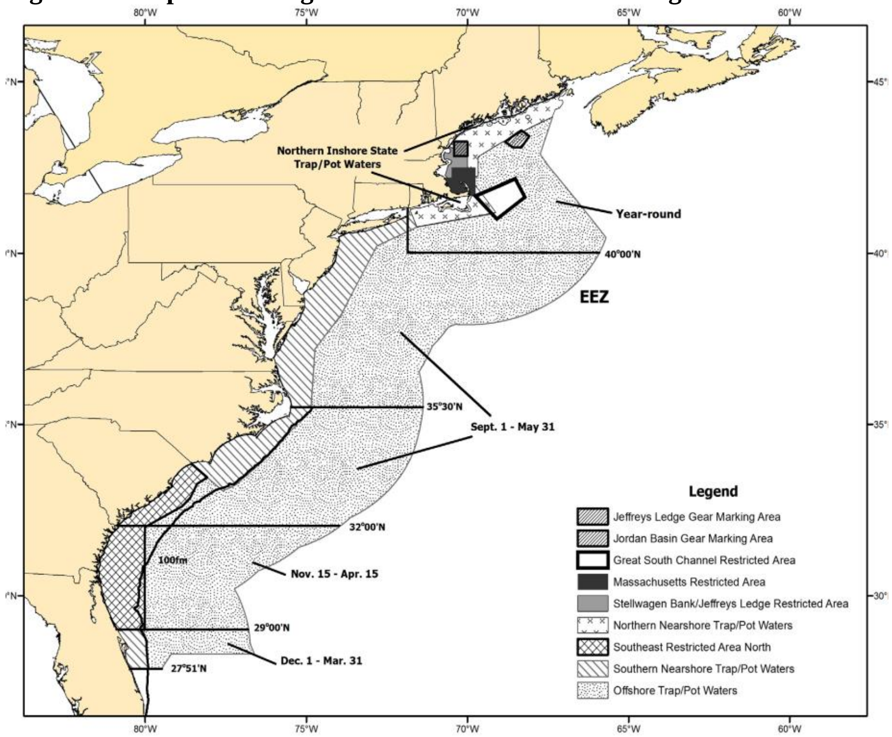
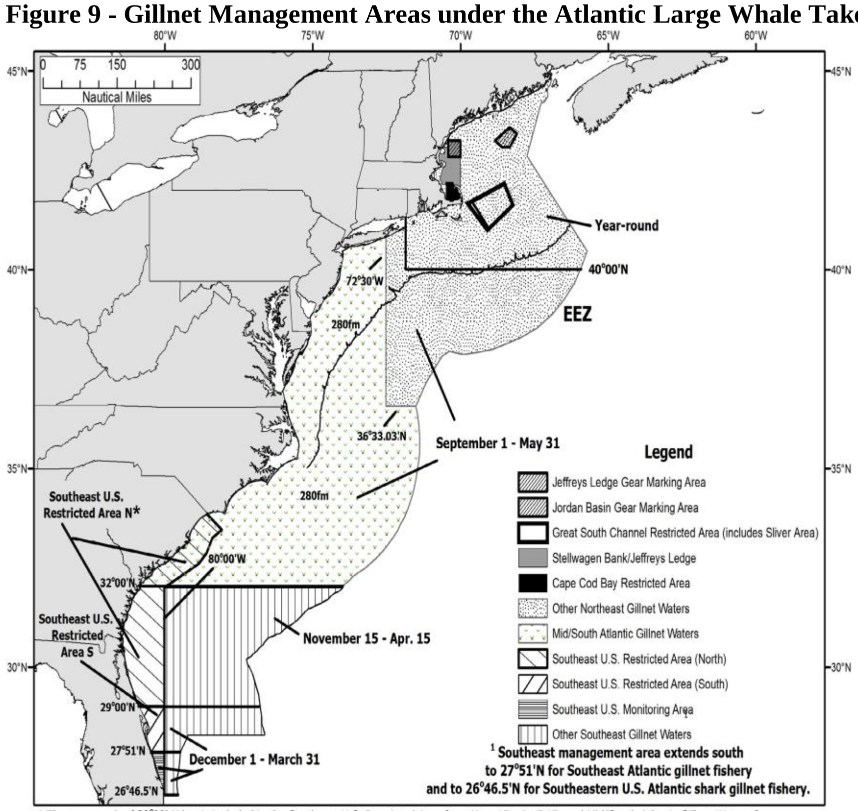


Figure 9 - Gillnet Management Areas under the Atlantic Large Whale Take Reduction Plan



* The area north of 32°00' N lat. is included in the Southeast U.S. Restricted Area from Nov. 15 - April 15, and Mid/South Atlantic Gillnet Waters from Sept. 1 - Nov. 14 and April 16 - May 31.

6.5.4.1.2 Small Cetaceans and Pinnipeds

Small cetaceans and pinnipeds are found throughout the waters of the Northwest Atlantic. As they feed, travel and breed in many of the same ocean areas utilized for commercial fishing, they are at risk of becoming entangled or bycaught in various types of fishing gear, with interactions resulting in serious injury or mortality to the animal. Pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injurious and mortalities of marine mammals in each fishery. Table 31 has information on small cetacean and pinniped species that have been observed incidentally injured and/or killed by Category I and II fisheries that operate in the affected environment of the multispecies fishery. Information is also provided on the most recent mean annual mortality estimates for those species observed incidentally injured/killed in the fishery from 2008-2012. For additional information on those species observed incidentally injured or killed in a particular fishery prior to 2008, refer to http://www.nmfs.noaa.gov/pr/sars/region.htm. Table 31 is not a comprehensive list of all species affected by each fishery; it only addresses those species that occur in the affected environment of the multispecies fishery and were observed serious injured or killed by a specific Category I or II. The recently issued LOF contains a comprehensive list of species affected by each category of fishery.

Table 31 - Small cetacean and pinniped species observed from 2008-2012 seriously injured and/or killed by Category I or II, fisheries in the affected environment of the multispecies fishery.

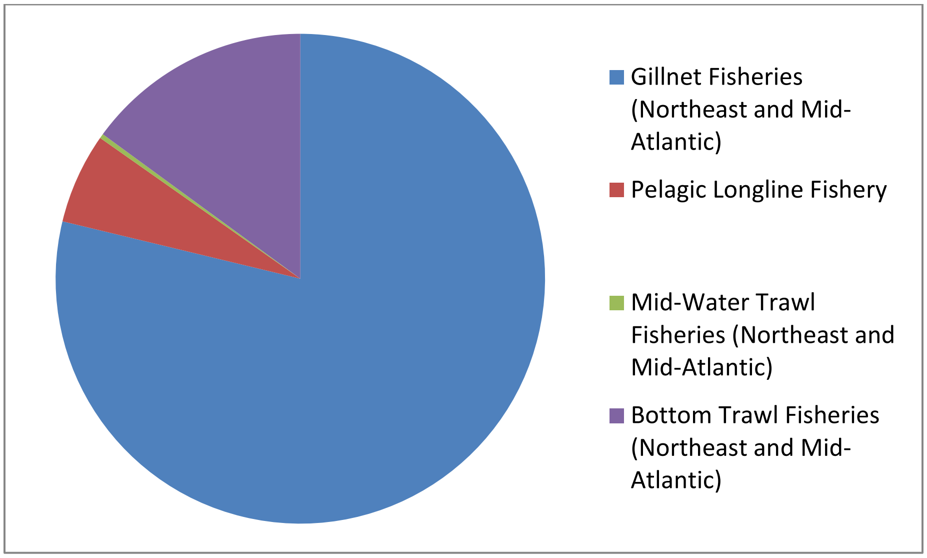
Fishery	Species Observed Injured/Killed	Mean Annual Mortality
Category I		
Northeast Sink Gillnet	Harbor porpoise	439
	Atlantic white sided dolphin	35
	Short-beaked common dolphin	56
	Long-finned pilot whale	0.6
	Risso's dolphin	1.2
	Harbor seal	378
	Gray seal	974
Mid-Atlantic Gillnet	Bottlenose dolphin (offshore)	14.1
	Harbor porpoise	199
	Short-beaked common dolphin	15
	Harbor seal	49
	Harp seal	N/A
	Gray seal	60
	Risso's dolphin	11
	Short-finned pilot whale[2]	140
	Short-beaked common dolphin	1.7
Pelagic Longline	Risso's dolphin	11
	Short-finned pilot whale	140
	Short-beaked common dolphin	1.7

	Bottlenose dolphin (offshore)	14.1
Category II		
Mid-Atlantic Mid-Water Trawl-Including Pair Trawl	Risso's dolphin	0.2
	White-sided dolphin	3.8
	Gray seal	0.2
	Harbor seal	0.2
Northeast Mid-Water Trawl-Including Pair Trawl	Gray seal	0.2
	Short-beaked common dolphin	0.4
	Long -finned pilot whales	3.6
	Harbor seal	0.9
Northeast Bottom Trawl	Harp seal	N/A
	Harbor seal	2.4
	Gray seal	33
	Long -finned pilot whales	31
	Short-beaked common dolphin	55
	White-sided dolphin	77
	Harbor porpoise	2.3
	Bottlenose dolphin (offshore)	10
	Risso's dolphin	2.0
Mid-Atlantic Bottom Trawl	Short-beaked common dolphin	161
	Risso's dolphin2	37
	Bottlenose dolphin (offshore)	21
	Gray seal	19
	Harbor seal	11.6
Sources: Waring et al. (2015); December 29, 2014, List of Fisheries (79 FR 77919).		

Based on the data in Table 31, it is apparent that there are multiple Category I and II fisheries in the affected environment of the multispecies fishery that result in the serious injury and morality of small cetaceans and pinnipeds. Based on the available NEFOP and ASM data from 2008-2012 (Figure 10), 79.0% of the total mean annual mortality to marine mammals (small cetaceans + seals, large whales excluded) is attributed to gillnet fisheries, followed by bottom trawl (15.0%), pelagic longline (6.0%) and mid-water trawl (0.3%) fisheries (Figure 13).

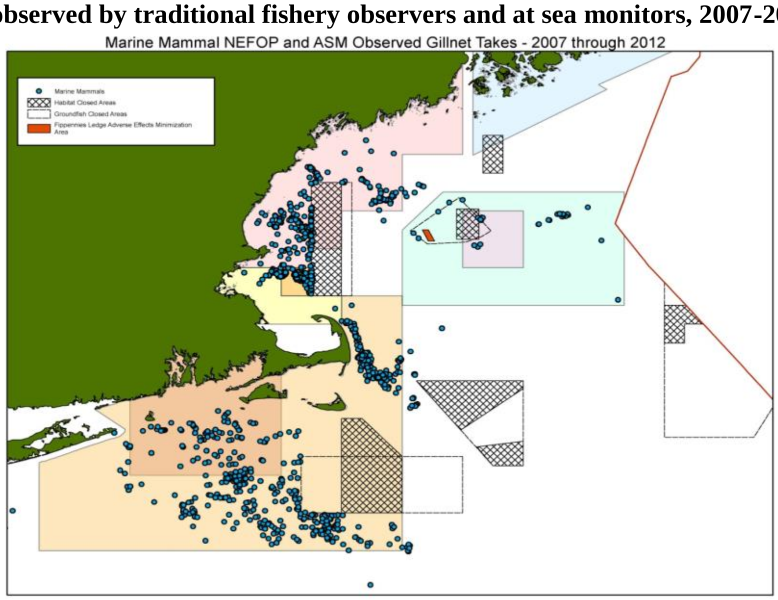
Although there are multiple Category I and II fisheries that result in the serious injury and morality of small cetaceans and pinnipeds, the risk of an interaction with a specific fishery is affected by multiple factors, including where and when fishing effort is focused, the type of gear being used, and how effort overlaps in time and space with specific species in the affected area. For instance, the following figures (Figure 11 and Figure 12) depict observed marine mammal takes (large whales excluded) in gillnet and trawl gear in the GOM, GB, and SNE sub-regions of the multispecies fisheries from 2007-2011. Over these last five years, there appears to be particular areas of the GOM, GB, and SNE sub-regions where fishing effort is overlapping in time and space with small cetacean or pinniped occurrence (Figure 11 and Figure 12); similar trends are seen during 2008-2012 (see Waring et al. 2015; maps depicting cumulative years are still in development, although individual maps/year can be found in this latter document).

Figure 10 - Total mean annual mortality of small cetaceans and pinnipeds by Category I and II fisheries, 2007 - 2011.



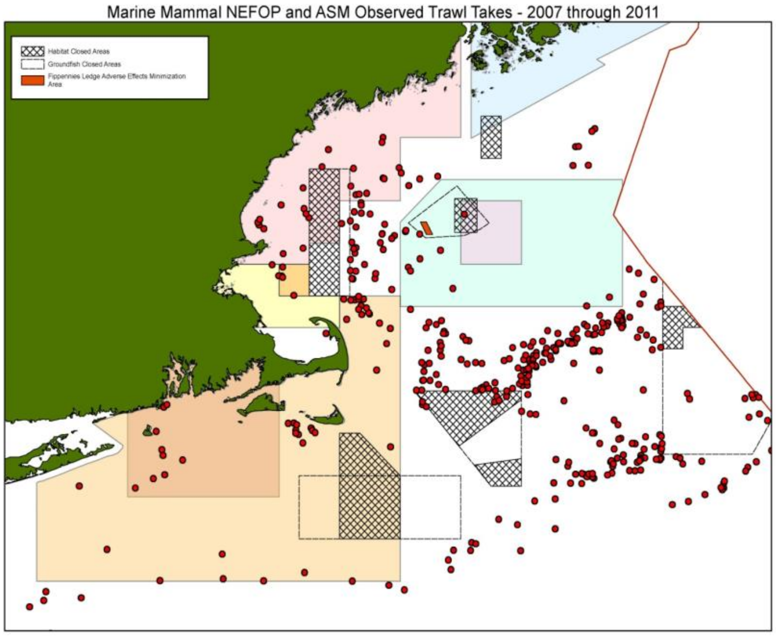
Although uncertainties such as shifting fishing effort patterns and data on true density (or even presence/absence) for some species remain, the available NEFOP and ASM data (Figure 11) do provide some insight into areas in the ocean where the likelihood of interacting with a particular species is high and therefore, provides a means to consider potential impacts of future shifts or changes in fishing effort on small cetaceans and pinnipeds.

Figure 11 - Map of marine mammal bycatch in gillnet gear in the Northeast (excluding large whales) observed by traditional fishery observers and at sea monitors, 2007-2011.



Notes: Small cetacean and pinnipeds have been observed taken primarily in: (1) the waters west of the GOM Habitat/Groundfish closed area: Harbor seals, harp seals, and harbor porpoise; (2) off of Cape Cod, MA: Gray seals, harbor seals, and harbor porpoise; (3) west of the NLCA (Groundfish closed area): Harbor porpoise, short- beaked common dolphin, gray seals, harp seals, and harbor seals; and (4) waters off southern Massachusetts and Rhode Island: Gray seals and harbor seals, and some harbor porpoise and short-beaked common dolphin.

Figure 12 - Map of marine mammal bycatch in trawl gear in the Northeast (excluding large whales) observed by traditional fishery observers and at sea monitors, 2007 - 2011.



Notes: Small cetacean and pinnipeds observed taken primarily in: (1) the waters between and around CA I and CA II (Groundfish closed areas): Short-beaked common dolphin, pilot whales, white-sided dolphins, gray seals, and some risso's dolphins and harbor porpoise; and (2) eastern side of the GOM Habitat/Groundfish closed area: White-sided dolphins, and some pilot whales and harbor seals.

Numerous species of small cetaceans and pinnipeds interact with Category I and II fisheries in the Atlantic Ocean; however, several species in Table 31 have experienced such great losses to their populations as a result of interactions with Category I and II fisheries that they are now considered strategic stocks under the MMPA.[10] These species include several stocks of bottlenose dolphins (See Table 31) and until recently, the harbor porpoise.[11] These species are the harbor porpoise, the Western North Atlantic Northern Migratory Coastal Stock of bottlenose dolphin and the Western North Atlantic Southern Migratory Coastal Stock of bottlenose dolphin. Section 118(f)(1) of the MMPA requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. As a result, the Harbor Porpoise TRP (HPTRP or Plan) and the Bottlenose Dolphin TRP (BDTRP or Plan) were developed and implemented for these species. The following is an overview for each TRP. [12] Additional information on each TRP can be found at: http://www.greateratlantic.fisheries.noaa.gov/protected/porptrp/ or http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm.

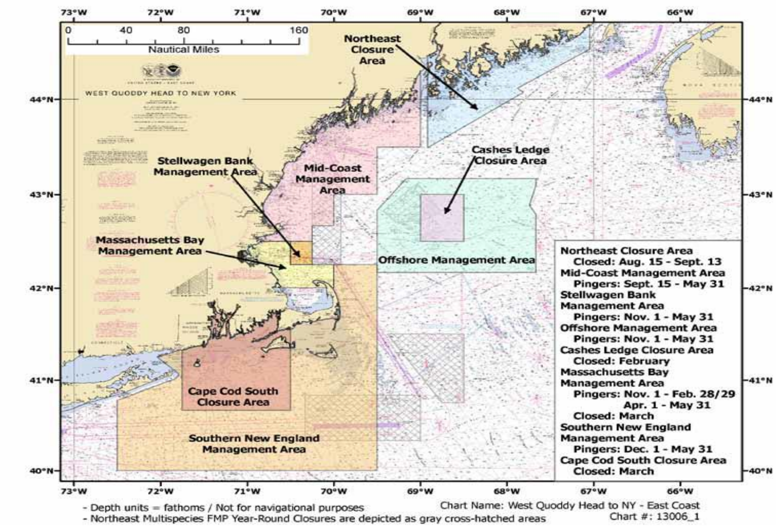
Harbor Porpoise Take Reduction Plan (HPTRP). To address the high levels of incidental take of harbor porpoise in the groundfish sink gillnet fishery, a Take Reduction Team was formed in 1996. A rule (63

[10] Harbor porpoise are considered a strategic stock under the MMPA as the level of direct human-caused mortality has exceeded the PBR level for this species. Both northern and southern migratory coastal stocks of bottlenose dolphins are considered a strategic stock under the MMPA as both stocks are designated as depleted under the Act.
[11] In the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring et al. 2015), harbor porpoise are no longer designated as a strategic stock.
[12] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring et al. 2015) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

FR 66464) to implement the Harbor Porpoise Take Reduction Plan, and therefore, to reduce harbor porpoise bycatch in U.S. Atlantic gillnets was published on December 2, 1998, and became effective on January 1, 1999; the Plan was amended on February 19, 2010 (75 FR 7383), and October 4, 2013 (78 FR 61821). Since gillnet operations differ between the New England and Mid-Atlantic regions, the following measures were devised for each region.

New England Region: The New England component of the HPTRP pertains to all fishing with sink gillnets and other gillnets capable of catching multispecies in New England waters from Maine through Rhode Island. This portion of the Plan includes time and area closures, as well as closures to multispecies gillnet fishing unless pingers are used in the manner prescribed in the TRP regulations (Figure 13). Details are in 50 CFR 229.33.

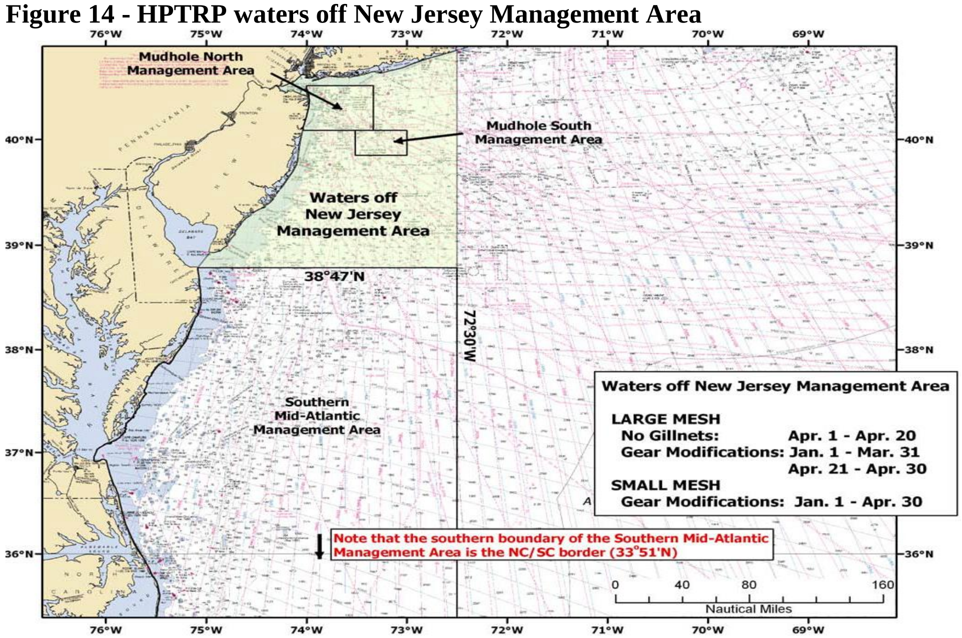
Figure 13 - HPTRP Management Areas for New England



[1] Harbor porpoise are considered a strategic stock under the MMPA as the level of direct human-caused mortality has exceeded the PBR level for this species. Both northern and southern migratory coastal stocks of bottlenose dolphins are considered a strategic stock under the MMPA as both stocks are designated as depleted under the Act.

Mid-Atlantic Region: The Mid-Atlantic portion of the HPTRP includes the shoreline from the southern shoreline of Long Island, New York to the N. Carolina/S. Carolina border. It includes four management areas (Waters off New Jersey, Mudhole North (located in waters off New Jersey Management Area), Mudhole South (located in waters off New Jersey Management Area), and Southern Mid-Atlantic), each with time and area closures to gillnet fishing unless the gear meets certain specifications. During regulated periods, gillnet fishing in each management area of the Mid-Atlantic is regulated differently for small mesh (>5 inches to <7 inches) and large (7-18 inches) mesh gear. The Plan includes some time and area closures in which gillnet fishing is prohibited regardless of the gear specifications. Figure 14 and Figure 15 depict the Mid-Atlantic Management Areas. Details are in 50 CFR 229.34 and the outreach guide:
http://www.greateratlantic.fisheries.noaa.gov/protected/porptrp/doc/hptrpmidatlanticguide_2015.pdf.

Figure 14 - HPTRP waters off New Jersey Management Area



Notes:

Mudhole North Management Area Small Mesh
Gear Modification: Jan. 1- Apr. 30
No Gillnet: Feb. 15-Mar. 15

Mudhole North Management Area Large Mesh
Gear Modification: Jan. 1- Apr. 30
No Gillnet: Feb. 15-Mar. 15; Apr. 1-Apr. 20

Mudhole South Management Area Small Mesh
Gear Modification: Jan. 1- Jan.31; Mar. 16-Apr.30
No Gillnet: Feb. 1-Mar.15

Mudhole South Management Area Large Mesh
Gear Modification: Jan. 1- Jan.31; Mar. 16-Mar. 31; Apr. 21- Apr. 30
No Gillnet: Feb. 1-Mar.15; Apr. 1- Apr. 20

Figure 15 - HPTRP Southern Mid-Atlantic Management Area

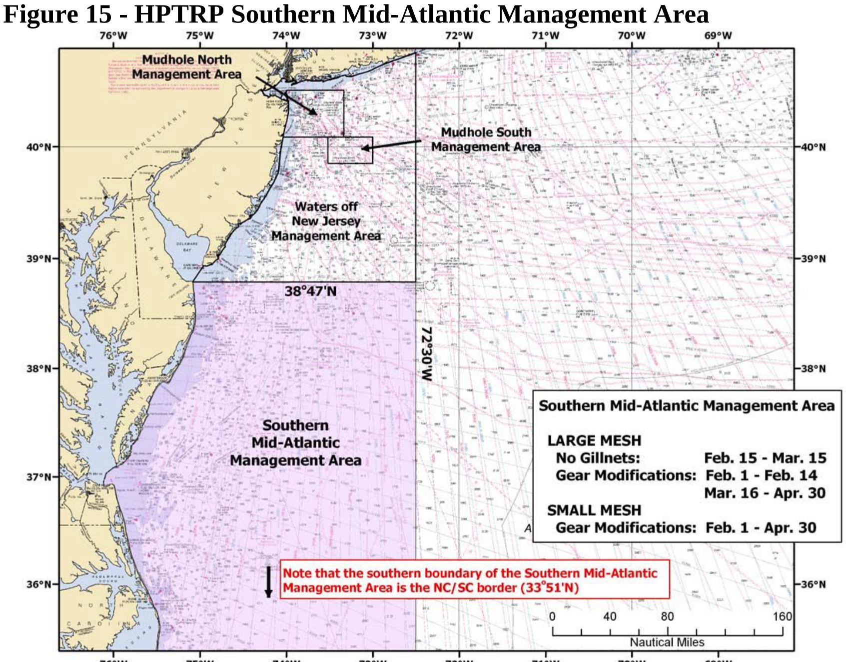


Chart Name: Cape Sable to Cape Hatteras
Chart #: 13003_1
- Not for navigational purposes - Depth units = fathoms

Bottlenose Take Reduction Plan. In April 2006, NMFS implemented the TRP for the WNA coastal stock of bottlenose dolphin (April 26, 2006, 71 FR 24776) to reduce the incidental mortality and serious injury in the Mid-Atlantic gillnet fishery and eight other Atlantic coastal fisheries operating within the dolphin's distribution, including the North Carolina inshore gillnet fishery, Southeast Atlantic gillnet fishery, Atlantic blue crab trap/pot fishery, Mid-Atlantic haul/beach seine fishery, NC long haul seine fishery, NC roe mullet stop net fishery, Southeastern U.S. Atlantic shark gillnet fishery, and the Virginia pound net fishery (NMFS 2002). The large mesh size restriction was revised under the Mid-Atlantic large mesh gillnet rule for conservation of endangered and threatened sea turtles to be consistent among Federal and state management. The BDTRP was amended on July 31, 2012 (77 FR 45268) to permanently continue restricting nighttime fishing of medium mesh gillnets operating in NC state waters. The Plan includes gillnet effort reduction, gear proximity requirements, gear or gear deployment modifications, and outreach and educational o reduce dolphin bycatch below the PBR. Details on the BDTRP are at: http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm.

6.5.4.2 Sea Turtles

Sea turtles are widely distributed in the waters of the Northwest Atlantic (Section 6.5.1), so they often occupy many of the same ocean areas used for commercial fishing and therefore, interactions with fishing gear are possible. Sea turtles have been incidentally injured or killed in various gear types (e.g., gillnets, trawls, hook and line gear, dredge); however, of the gear types that could be possibly used in the multispecies fishery, trawl and gillnet pose the greatest risk to sea turtles. Most of the observed interactions of sea turtles with trawl and gillnet gear have been in the Mid-Atlantic rather than the GOM. As few sea turtle interactions have been observed in the GOM and GB regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with trawl or gillnet gear in these regions and therefore, produce a bycatch estimate for these regions. The following bycatch estimates are based on interactions in the Mid-Atlantic.

Warden (2011a) estimated that from 2005-2008, the average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic (i.e., south of Cape Cod, MA, to approximately the NC/SC border) was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but being released through a Turtle Excluder Device.[13] Of the 292 average annual observable loggerhead interactions, about 44 of those were adult equivalents.[14] Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic (i.e., defined by the boundaries of the Mid-Atlantic Ecological Production; roughly waters west of 71^{o}W to the North Carolina/South Carolina border) was 231 (CV=0.13, 95% CI=182-298). Of the 231 total average annual loggerhead interactions, approximately 33 of those were adult equivalents (Murray 2015). These latter estimates are a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, which Murray (2008) estimated to be 616 sea turtles (CV=0.23, 95% CI over the nine-year period: 367-890). Warden (2011b), using species landed, also estimated total loggerhead interactions attributable to managed species. Five loggerhead interactions (estimated observable and unobservable but quantifiable) were attributed to the Northeast multispecies fishery. In addition, green, Kemp's ridley, and leatherback sea turtles have been documented in bottom trawl gear in areas that overlap with the fishery (NEFSC FSB database). One of these, a leatherback sea turtle, was captured on a trip where the top landed species was whiting, while another sea turtle (unknown species) was captured on trip where the top landed species was pollock.

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[13] Warden (2011a) and Murray (2013) define the mid-Atlantic slightly differently, but both include waters north to Massachusetts. See the respective papers for a more complete description of these areas.

[14] Adult equivalence considers the reproductive value of the animal (Murray 2013; Warden 2011a), providing a "common currency" of expected reproductive output from the affected animals (Wallace et al. 2008) and is an important metric for understanding population level impacts (Haas 2010).

Murray (2013) conducted an assessment of loggerhead and unidentified hard-shell turtle interactions in Mid-Atlantic gillnet gear from 2007-2011. Based on 2007-2011 NEFOP data, interactions between these species and commercial gillnet gear in the Mid-Atlantic averaged 95 hard-shelled turtles and 89 loggerheads (equivalent to 9 adults) annually. However, average interactions in large mesh gear in warm, southern Mid-Atlantic waters have declined relative to those from 1996-2006 (Murray 2009), as did the total commercial effort (Murray 2013). Murray (2013) also estimated interactions by managed species landed in gillnet gear from 2007-2011. An estimate was not made for the Northeast multispecies fishery; but, takes have been observed in sink gillnet fisheries targeting other species. One of these was documented by an observer north of 42° N. Leatherback, Kemp's ridley, and green sea turtles have also been documented in Mid-Atlantic gillnet gear by observers (NEFSC FSB database), with observed takes of Kemp's ridley and leatherback sea turtles in overlapping areas with the Northeast multispecies fishery. Although sea turtles can interact with multiple gear types (e.g., trawl, gillnet), interaction is affected by multiple factors, including where and when fishing effort is focused, gear type, environmental conditions, and sea turtle occurrence and distribution. Murray and Orphanides (2013) recently evaluated fishery-independent and dependent data to identify environmental conditions associated with turtle presence and the subsequent risk of a bycatch encounter. Fishery independent encounter rates were a function of latitude, sea surface temperature (SST), depth, and salinity. When the model was fit to fishery-dependent data (gillnet, bottom trawl, and scallop dredge), encounter rates decreased as latitude increased; increased as SST increased; a bimodal relationship between encounter rates and salinity; and higher encounter rates in depths 25-50 m. Similarly, Murray (2013) concluded, based on 2007-2011 data of loggerhead interactions in gillnet gear, that bycatch rates were associated with latitude, SST, and mesh size, with highest interaction rates in the southern Mid-Atlantic in warm SST and in large (>7") mesh. Based on the 2005-2008 data obtained on loggerhead interactions in bottom trawl gear, Warden (2011a) also found that latitude, depth and SST were associated with the interaction rate, with the rates being highest south of 37° N in waters <50 m deep and SST >15°C (Table 32).

Table 32 - Mid-Atlantic trawl bycatch rates

Latitude Zone	Depth	SST	Loggerheads/Day Fished
<37 °N	≤50 m	≤15° C	0.4
	≤50 m	≥15° C	2.06
	>50 m	≤15° C	0.07
	>50 m	>15° C	0.09
37 - 39 °N	≤50 m	≤15° C	0.04
	≤50 m	≥15° C	0.18
	>50 m	≤15° C	0.01
	>50 m	>15° C	0.07
>39 °N	≤50 m	≤15° C	<0.01
	≤50 m	≥15° C	0.03
	>50 m	≤15° C	<0.01
	>50 m	>15° C	0.01

Source: Warden (2011a).

6.5.4.3 Atlantic Sturgeon

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range, although genetic analyses suggests that the distribution of each varies within that range (Dunton, et al. 2010; King et al. 2001; Laney, et al. 2007; O'Leary, et al. 2014; Waldman, et al. 2013; Wirgin et al. 2012a). Three separate publications using different information sources reached the same conclusion; Atlantic sturgeon occur primarily in waters <50 m (although deeper waters are also used), aggregate in certain areas, and exhibit seasonal movement patterns (Dunton, et al. 2010; Erickson, et al. 2011; Stein, et al. 2004a). These characteristics of Atlantic sturgeon occurrence and distribution result in Atlantic sturgeon occupying many of the same ocean areas utilized for commercial fishing and therefore, occupying areas in which interactions with fishing gear are possible.

There are three documents, covering three time periods, that use data collected by the NEFOP to describe bycatch of Atlantic sturgeon: Stein et al. (2004a) for 1989-2000; ASMFC (2007) for 2001-2006; and Miller and Shepard (2011) for 2006-2010. None of these provide estimates of Atlantic sturgeon bycatch by DPS. Information in all three documents indicate that sturgeon bycatch occurs in gillnet and trawl gear, with the most recent document estimating, based on NEFOP and VTR data from 2006-2010, that annual bycatch of Atlantic sturgeon was 1,342 and 1,239, respectively. Specifically, Miller and Shepard (2011) observed Atlantic sturgeon interactions in trawl gear with small (<5.5 in) and large (≥5.5 in) mesh sizes, as well as gillnet gear with small (<5.5 in), large (5.5-8 in), and extra-large mesh (>8 in) sizes. Although Atlantic sturgeon were observed to interact with trawl and gillnet gear with various mesh sizes, based on NEFOP data, they concluded that gillnet gear, in general, posed a greater risk of mortality to Atlantic sturgeon than did trawl gear. Estimated mortality rates in gillnet gear were 20.0%, while those in otter trawl gear were 5.0%. Similar conclusions were reached in Stein et al. (2004a) and ASMFC (2007) reports, in which both studies also concluded, after review of NEFOP data from 1989-2000 and 2001-2006, that observed mortality is much higher in gillnet gear than in trawl gear. Based on the information presented in these three documents, factors thought to increase the risk of Atlantic sturgeon bycatch, and therefore death, in gillnet gear include:

- Setting gillnet gear at depths <40 m;
- Using gillnet gear with mesh sizes >10 in;
- Setting gillnet gear during spring, fall, and winter months;
- Long soak times (i.e., >24 h); and
- Setting gear during warmer water temperatures

Although Atlantic sturgeon deaths have rarely been reported in otter trawl gear (ASMFC 2007), it is important to recognize that effects of an interaction may occur long after the interaction. Based on physiological data obtained from Atlantic sturgeon captured in otter trawls, Beardsall et al. (2013) suggests that factors such as longer tow times (i.e., >60 min), prolonged handling of sturgeon (>10 min on deck), and the type of trawl gear/equipment used, may increase the risk of physiological disruption or impairment (e.g., elevated cortisol levels, immune suppression, impaired osmoregulation, exhaustion) to Atlantic sturgeon captured in otter trawls and therefore, may result in an increased risk of post-release mortality. Post-release exhaustion, even after a 60 minute trawl capture, results in behavioral disruption to Atlantic sturgeon and caution that repeated bycatch events may compound post-release behavioral effects to Atlantic sturgeon which in turn, may effect essential life functions of Atlantic sturgeon (e.g., predator avoidance, foraging, migration to foraging or spawning sites) and therefore, Atlantic sturgeon survival (Beardsall, et al. 2013). Although that study provides some initial insight into the post-release effects to Atlantic sturgeon captured in trawl gear, additional studies are needed to clearly identify the “after” effects of a trawl interaction. As it is remains uncertain what the overall impacts to Atlantic sturgeon survival are from trawl interactions, trawls should not be completely discounted as a form of gear that poses a mortality risk to Atlantic sturgeon.

6.5.4.4 Atlantic Salmon

The marine range of the Atlantic salmon GOM DPS extends from the GOM (primarily northern portion), to the coast of Greenland (Fay, et al. 2006; NMFS & USFWS 2005). Although the marine distribution of

Atlantic salmon likely overlaps with commercial fisheries, there have been a low number of observed interactions with fisheries and various gear types. According to the Biological Opinion issued by GARFO on December 16, 2013, NMFS NEFOP and At-Sea Monitoring Programs documented 15 individual salmon incidentally caught on over 60,000 observed commercial fishing trips from 1989 through August 2013 (Kocik et al. 2014; NMFS 2013a). Atlantic salmon were observed in gillnet (11/15) and bottom otter trawl gear (4/15), with ten listed as “discarded” and five as mortalities (Kocik pers. comm. 2013 in NMFS 2013a). The genetic identity of these captured salmon is unknown; however, all 15 fish are considered to be part of the GOM DPS, although some may have originated from the Connecticut River restocking program (i.e., those caught south of Cape Cod, Massachusetts).

The above information suggests that interactions with Atlantic salmon are rare events (Kocik, et al. 2014; NMFS 2013a). However, it is important to recognize that observer program coverage is not 100%. As a result, it is likely that some interactions with Atlantic salmon have occurred, but have not been observed or reported.

6.6 Human Communities

This EA considers and evaluates the effect management alternatives may have on people's way of life, traditions, and community. These economic and social impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While it is possible that these impacts could be solely experienced by individual fishermen, 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 Proposed Action. This includes a description of the sector and common pool participants' groundfish fishing and their homeports. Table 33 contains a summary of major trends in the groundfish fishery. Additional information may be found in the FY2010, FY2011, and FY2012 and FY2013 performance reports for this fishery by the NEFSC (Kitts et al. 2011; Murphy et al. 2012; Murphy et al. 2014; Murphy et al. 2015).

Table 33 - Summary of major trends in the Northeast multispecies fishery.

	2010			2011		
	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
Groundfish Gross Revenue	$83,212,207	$81,165,969	$2,046,238	$88,821,349	$87,982,963	$838,386
Non-groundfish Gross Revenue	$210,068,225	$115,537,375	$94,530,850	$235,565,188	$141,895,314	$93,669,874
Total Gross Revenue	$293,280,432	$196,703,344	$96,577,088	$324,386,537	$229,878,277	$94,508,260
Groundfish average price	$1.42	$1.41	$1.58	$1.43	$1.42	$1.58
Non-groundfish average price	$1.21	$1.18	$1.24	$1.11	$1.11	$1.11
Number of active vessels*	855	437	418	777	443	334
Number of active vessels that took a groundfish trip**	446	304	142	418	302	116
Number of groundfish trips	13,859	11,575	2,284	16,138	13,858	2,280
Number of non-groundfish trips	38,507	16,547	21,960	33,727	16,814	16,913
Number of days absent on groundfish trips	18,737	17,131	1,605	21,895	20,393	1,503
Number of days absent on non-groundfish trips	31,354	16,023	15,331	28,032	15,485	12,547
Total Crew Positions	2,268			2,166		
Total Crew-trips	125,033			122,785		
Total Crew-days	171,278			171,342		

	2012			2013		
	Total	**Sector Vessels**	**Common Pool**	**Total**	**Sector Vessels**	**Common Pool**
Groundfish Gross Revenue	$67,815,297	$67,209,195	$606,102	$55,220,469	$54,211,824	$1,008,645
Non-groundfish Gross Revenue	$228,136,612	$135,359,399	$92,777,213	$214,665,116	$129,680,139	$84,984,976
Total Gross Revenue	$295,951,909	$202,568,594	$93,383,315	$269,885,585	$183,891,963	$85,993,622
Groundfish average price	$1.43	$1.43	$1.71	$1.31	$1.30	$1.59
Non-groundfish average price	$1.07	$1.03	$1.13	$1.00	$0.95	$1.10
Number of active vessels*	763	445	318	735	419	316
Number of active vessels that took a groundfish trip**	400	303	97	327	245	82
Number of groundfish trips	14,328	12,990	1,338	10,056	9,125	911
Number of non-groundfish trips	33,024	17,172	15,852	33,317	17,900	15,417
Number of days absent on groundfish trips	19,839	18,998	842	17,013	16,356	657
Number of days absent on non-groundfish trips	29,151	16,341	12,811	29,439	16,916	12,523
Total Crew Positions	2,135			2,039		
Total Crew-trips	117,118			106,700		
Total Crew-days	169,129			157,600		

Notes: Data includes all vessels with a valid limited access multispecies permit. Sector plus common pool vessel counts may exceed the total vessel count because vessels may switch between sector and common pool eligibilities during the fishing year. Revenue and price reported in 2010 dollars. "Trips" refer to commercial trips in the northeast Exclusive Economic Zone (EEZ). Past reports included party/charter trips. From Murphy et al. (2015).

6.6.1 Groundfish Fishery Overview

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 rule 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 FY2010, the NMFS Regional Administrator announced that, in addition to a previously stated 18% reduction in DAS, interim rules would be implemented to reduce fishing mortality during FY2009. 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
- Reduction in some groundfish allocations (NOAA 2009).

In 2007, the Northeast multispecies fishery included 2,515 permits. Of these, about 1,400 were limited access. There were about 660 vessels that actively fished. Those vessels include a range of gear types: hook, bottom longline, gillnet, and trawl (NEFMC 2009b). In FY2009, between 40 and 50 of these vessels were members of the GB Cod Sectors. The passage of Amendment 16, implemented in FY2010, ushered in a new era of sector management in the New England groundfish fishery. Since FY2010, over 50% of eligible northeast groundfish multispecies permits and over 90% of landings history has been associated. The remaining vessels were common pool groundfish fishing vessels.

Amendment 16 to the Northeast Multispecies FMP was implemented for the New England groundfish fishery starting on May 1, 2010, the start of the 2010 fishing year. There were two substantial 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 all 20 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.[15] Sectors received ACE for nine of 13 groundfish species (14 stocks + quotas for Eastern US/Canada cod and haddock; 16 ACEs) in the FMP and became exempt from many of the effort controls previously used to manage the fishery.

[15] To determine the ACE, the sum of all of the sector members' potential sector contributions (PSCs) (a percentage of the ACL) are multiplied by the ACL.

During the first year of sector management, 17 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 commercial groundfish sub-ACL, based on their collective level of historical activity in the groundfish fishery. Approximately half (46%) of the 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 portion of the commercial groundfish sub- ACL for all stocks (about 2% for 2010) before the end of the fishing year.

In the second year of sector management, 58% of limited access permits enrolled in one of 16 sectors or one of two lease-only sectors. From 2010 to 2011, the number of groundfish limited access eligibilities belonging to a sector increased by 66, while the number of these permits in the common pool decreased by 85. At the start of FY2011, vessels operating within a sector were allocated about 98% of the total groundfish sub-ACL, based on historical catch levels. Those vessels that opted to remain in the common pool were given access to about 2% of the groundfish sub-ACL based on the historic catch. The same effort controls employed in 2010 were again used in 2011, to ensure the groundfish catch made by common pool vessels did not exceed the common pool's portion of the commercial groundfish sub-ACL.

In FY12, 60% of limited access permits enrolled in sectors. From FY2011 to FY2012, the number of groundfish limited access eligibilities belonging to a sector increased by 22, while the number of these permits in the common pool decreased by 36. Although some trends in the fishery are a result of management changes made to the fishery in the years prior to Amendment 16, many of these trends reflect the current system of catch share management.

In FY2013, the number of groundfish limited access eligibilities for sector members stayed relatively constant (increasing by 1) while the number of eligibilities for the common pool decreased by 29. Sectors again accounted for around 60% of all limited access permits with the sector sub-ACL accounting for 98% of the total commercial groundfish ACL.

6.6.2 Fleet Characteristics

The overall trend since the start of sector management has been a decline in the number of vessels with a limited access groundfish permit, with a low of 1,119 vessels in FY2013 (Table 34). Of those vessels, those with revenue from at least one groundfish trip have also declined, to only 327 in FY2013. The proportion of vessels affiliated with a sector has increased each year since FY2010. A key aspect of Amendment 16 is the ability of a sector to jointly decide how its ACE will be harvested, through redistribution within a sector and/or transferring ACE between sectors. Because inactive sector vessels may benefit if other sector vessels harvest their allocation, changes in the number of inactive vessels may result from a transfer of allocation and not necessarily vessels exiting the fishery. Since FY2010, 34-39% of the vessels were inactive (no landings). Of these inactive vessels, 64-69% were affiliated with sectors.

Table 34 - Number of vessels by fishing year.

	2010	2011	2012	2013
	As of May 1 each Fishing Year:			
Total groundfish limited access eligibilities	**1,441**	**1,422**	**1,408**	**1,380**
Eligibilities held as Confirmation of Permit History	**94**	**168**	**228**	**273**
	During any part of the fishing year*:			
Total eligible vessels	1,409	1,321	1,223	1,154
Eligible vessels that did not renew a limited access groundfish permit	26	42	46	35
Vessels with a limited access groundfish permit	1,383	1,279	1,177	1,119
	While under a limited access groundfish permit:			
... those with revenue from any species**	855	777	763	735
... those with revenue from at least one groundfish trip	446	418	400	327
... those with no landings	529	502	414	384
Percent of inactive (no landings) vessels	(38%)	(39%)	(35%)	(34%)

*On May 1st of the fishing year the number of vessels will equal to the number of eligibilities not in Confirmation of Permit History (CPH). Over time the number of vessels will differ from the number of eligibilities because these eligibilities can be transferred from vessel to vessel during the fishing year. 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 data for either Sector or Common Pool.

**Active vessels in this report received revenue from any species while fishing under a limited access groundfish permit.

6.6.3 Effort

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 number of active vessels has declined each year since at least FY2009. This decline has occurred across all vessel size categories (Table 35). Since FY2009, the 30' to < 50' vessel size category, which has the largest number of active groundfish vessels, experienced a 38% decline (305 to 159 active vessels). The <30' vessel size category, containing the least number of active groundfish vessels, experienced the largest (50%) reduction since FY2009 (34 to 17 vessels). The vessels in the largest (≥75') vessel size category experienced the least reduction (30%) since FY2009.

Table 35 - Vessel activity by size class.

	FY2009	FY2010	FY2011	FY2012	FY2013
Vessels with revenue from any species					
Less than 30	73	65	51	49	51
30 to < 50	478	459	403	398	384
50 to < 75	236	218	212	205	193
75 and above	129	113	111	111	107
Total	916	855	777	763	735
Vessels with revenue from at least one groundfish trip					
Less than 30	34	24	20	16	17
30 to < 50	305	242	218	207	159
50 to < 75	157	121	119	117	102
75 and above	70	59	61	60	49
Total	566	446	418	400	327

Source: Murphy et al. (2015, Tables 13 and 14).

Some of the proposed benefits of a catch share system of management are the potential efficiency gains associated with increasing operational flexibility (NOAA 2010). Being released from the former effort controls, but being held to ACLs, sector vessels were expected to increase their catch per unit effort by decreasing effort. Between 2009 and FY2010, the number of groundfish fishing trips[16] and total days absent on groundfish trips declined by 46% and 24%, respectively (Table 36).[17] During the second year of sector management, 2011, the number of groundfish fishing trips and total days absent on groundfish trips increased. Effort on groundfish trips generally decreased in FY2012. Vessels took fewer groundfish trips, with fewer total days absent of groundfish trips, though average trip length increased slightly over FY2011.

The groundfish fleet overall took slightly more non-groundfish trips, with a slight increase in total days absent on these trips, in 2013 than it did in 2012. The average trip length for non-groundfish trips taken by the fleet fell very slightly in 2013 from 2012, but was at its second highest point in the 2010-2013 time series (Table 36). The total number of non-groundfish trips taken by the fleet in 2013 was 33,317 trips, a 0.9% (+293 trips) increased from 2012. Overall, the number of non-groundfish trips taken by the fleet has decreased 13.5% over 2010-2013. The total number of days absent on non-groundfish trips in 2013

[16] 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.
[17] The data is taken from different source materials (VMS, etc.) than other data in this document, and thus, may be slightly different than.

was higher than it was in 2012, with 288 (+1.0%) more days absent. However, the total number of days absent on non-groundfish trips taken by the fleet has decreased 6.1% over the 2010-2013 period. Average trip length on non-groundfish trips has increased overall from 2010-2013 by 4.7% (+0.04 days absent), but fell very slightly by 1.1% (-0.01 days absent) in 2013 from 2012 (Table 36).

Table 36 - Effort by active vessels.

	FY2009	FY2010	FY2011	FY2012	FY2013
Number of trips					
groundfish	25,897	13,859	16,138	14,328	10,056
non-groundfish	37,173	38,507	33,727	33,024	33,317
Number of days absent on trips					
groundfish	24,605	18,737	21,895	19,839	17,013
non-groundfish	31,606	31,354	28,032	29,151	29,439
Average trip length*					
groundfish	0.96	1.35	1.36	1.39	1.69
(std. dev.)	(1.74)	(2.13)	(2.19)	(2.20)	(2.40)
non-groundfish	0.92	0.86	0.86	0.91	0.90
(std. dev.)	(1.66)	(1.56)	(1.52)	(1.60)	(1.56)

Source: Murphy et al. (2015, Table 15).
*This is the average trip length of all individual trips that have non-missing values for days absent. Since some trip records have missing values for days absent, average trip length reported here may be higher than what is obtained by dividing the overall number of days absent by the overall number of trips.

6.6.4 Landings and Revenue

Total groundfish landings on trips made by vessels possessing a limited access groundfish permit in FY2013 were 42.2M pounds, which is the lowest landings since at least FY2009 (Table 37). Because only 16 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 increased from 178.1M pounds in FY2010 to 213.8M pounds in FY2011, and remained fairly steady at 212.0M pounds in FY2012. Declining groundfish landings were coupled with little growth in non-groundfish landings for the fleet in 2013. Total landings of all species on all trips were 256.4 million pounds in 2013, a 1.6% decrease from 2012 (260.5 million pounds). This compares to landings ranging from 232.9M – 274.5M pounds in the 2009–2011 fishing years. In 2013, groundfish accounted for only 16.5% of total landings by the groundfish fleet, sectors landed almost 70% of total landings and 98.5% of all groundfish landings.

Table 37 - Total landing and revenue from all trips by fishing year.

	FY2009	FY2010	FY2011	FY2012	FY2013
Landed Pounds					
Groundfish	68,416,222	58,712,494	62,284,826	47,424,690	42,247,934
Non-Groundfish	185,631,323	174,196,562	212,298,102	213,059,587	214,153,861
Total Pounds	254,047,546	232,909,055	274,582,928	260,484,276	256,401,794
Gross Revenue (in 2010 dollars)					
Groundfish	$83,386,467	$83,212,207	$88,821,349	$67,815,297	$55,220,469
Non-Groundfish	$182,312,457	$210,068,225	$235,565,188	$228,136,612	$214,665,116
Total Revenue	$265,698,924	$293,280,432	$324,386,537	$295,951,909	$269,885,585

Source: Murphy et al. (2015, Table 2).
* Deflated by the calendar year 2010 Q2 GDP Implicit Price Deflator.

Table 38 - Total landings and nominal revenue form groundfish trips by fishing year.

	FY2009	FY2010	FY2011	FY2012	FY2013
Landed Pounds					
Groundfish	68,362,567	58,601,455	62,143,119	47,364,684	42,111,095
Non-Groundfish	30,965,367	23,509,706	29,041,581	27,229,162	19,130,060
Total Pounds	99,327,934	82,111,161	91,184,700	74,593,845	61,241,154
Gross Revenue (in 2010 dollars)					
Groundfish	$82,456,833	$83,000,074	$88,607,816	$67,696,520	$55,019,495
Non-Groundfish	$25,862,188	$23,642,678	$32,147,825	$25,079,842	$20,520,806
Total Revenue	$108,319,021	$106,642,752	$120,755,641	$92,776,361	$75,540,301

Source: Murphy et al. (2015, Table 3).

During the first year of sector management, groundfish revenues from vessels with limited access groundfish permits in FY2010, were $83.2M (Table 37). This was slightly lower than FY2009 revenues. In FY2011, the groundfish revenues from vessels with limited access groundfish permits were $98.8M. Groundfish revenue in FY2012 decreased to a four-year low of $67.8 million (22.9% lower than in 2011), decreasing even further in FY2013 to $55.2 million. Non-groundfish revenue decreased to $235.7 million (2% lower than in FY2011), but was still higher than in FY2009 and FY2010. In FY2013 sector vessels accounted for 68% of all revenue earned by limited access groundfish vessels. Sector vessels also accounted for 98% of groundfish revenue and 60% of non-groundfish revenue in 2013 (Table 38).

6.6.5 ACE Leasing

Starting with allocations in FY2010, each sector was given an initial ACE determined by the pooled potential sector contribution (PSC) from each entity joining that sector. Every limited access groundfish permit also has a tracking identification number called a Moratorium Right Identifier (MRI). PSC is technically allocated to MRIs, which are subsequently linked to vessels through Northeast Multispecies limited access fishing permits. A vessel's PSC is a percentage share of the total allocation for each allocated groundfish stock based on that vessel's fishing history. Once a sector roster and associated PSC is set at the beginning of a fishing year, each sector is then able to distribute its ACE among its members. By regulation, ACE is pooled within sectors, however most sectors seem to follow the practice of assigning catch allowances to member vessels based on PSC allocations. This is an important assumption because vessels catching more than their allocation of PSC must have leased additional quota, either as PSC from within the sector or as ACE from another sector.

During FY2010, 282 sector-affiliated MRIs had catch that exceeded their individual PSC allocations for at least one stock. These vessels are then assumed to have leased in an additional 22M pounds of ACE and/or PSC with an approximate value of $13.5M. In FY2011, 256 sector-affiliated vessels had catch that exceeded their individual PSC allocations. These vessels are then assumed to have leased in 31M pounds of quota. Although the number of vessels leasing ACE fell by 9% the estimated number of pounds leased was almost 41% greater in FY2011 than in FY2010 (Murphy, et al. 2012). There were 241 sector-affiliated MRIs had catch that exceeded individual PSC allocations for at least one stock. These MRIs leased in >23M pounds of ACE and/or PSC in FY2012 (Murphy, et al. 2014). In FY2013, 224 sector-affiliated MRIs had catch that exceeded individual PSC allocations for at least one stock in 2013, down from 242 in FY 2012. These MRIs leased in nearly 21 million pounds of ACE and/or PSC in FY 2013 (Murphy, et al. 2015).

6.6.6 Fishing Communities

There are over 400 communities that have been the homeport or landing port to one or more Northeast groundfish fishing vessels since 2008. These ports occur throughout the New England and Mid-Atlantic. Consideration of the economic and social impacts on these communities from proposed fishery regulations is required by the National Environmental Policy Act (NEPA 1970) and the M-S Act. 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 dependent” on and “substantially engaged” in the groundfish fishery can be difficult.

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 ports that may only have a small number of active vessels.

6.6.6.1 Primary and Secondary Fishing Ports

Communities dependent on the groundfish resource have been categorized into primary and secondary port groups, so that community data can be cross-referenced with other demographic information (Table 39). Consistent with the approach taken in Amendment 18 (submitted October 30, 2015), both the regional quotient (port groundfish revenue/regional groundfish revenue) and local quotient (port groundfish revenue/port all species revenue) were calculated to provide an objective measure of the level of involvement in groundfishing for each port. All metrics were calculated using the annual average over the most recent five years for which landings data are available (FY 2009-FY 2013).[18]

Primary ports are those communities that are substantially engaged in the groundfish fishery, and which are likely to be the most impacted by groundfish management measures. Primary ports are selected based on the following characteristics:

1. On average over FY 2009-FY 2013, three or more vessels reported groundfish landings in the port, selling to three or more dealers (not necessarily located in the port).
2. At least $100,000 average annual revenue (for all species, not just groundfish).[19]
3. Top 10 ranking in regional quotient or local quotient.

Secondary ports are those communities that may not be as dependent or engaged in the groundfish fishery as the primary ports, but are involved in the groundfish fishery to a lesser extent. Because of the size and diversity of the groundfish fishery, it is not practical to examine each secondary port individually. However, they are listed here to provide a broader scope of potential communities impacted by groundfish management measures. Secondary ports are selected based on the following characteristics:

1. At least $100,000 average annual revenue (for all species, not just groundfish).
2. Top 11-30 ranking in regional quotient or local quotient.

Using the above method identifies place-based fishing communities based on level of engagement. Because significant geographical shifts in the distribution of groundfish fishing activity have occurred, the characterization of some ports as "primary" or "secondary" may not reflect their historical participation in and dependence on the groundfish fishery. Descriptions of communities involved in the multispecies fishery, and further descriptions of Northeast fishing communities in general, can be found on the Northeast Fisheries Science Center's website (NEFSC 2013d).

[18] Amendment 13 organized coastal communities in the greater atlantic region by port groups based on fishery participation since 1994. Amendment 16 identified primary and secondary ports using groundfish landings by port from a baseline period of 1994-1999. For additional information, see section 6.2.8.2 of Amendment 16.
[19] There are 22 communities that have >$100,000 average annual groundfish revenue, including all of the primary ports identified with this method.

Table 39 - Primary and secondary multispecies port communities

	Multispecies Port Community	
State	**Primary**	**Secondary**
Maine	Portland	Saco
		Cape Porpoise
		Port Clyde
		Cundy's Harbor
		Sprucehead
		Kennebunkport
		Boothbay Harbor
New Hampshire	Portsmouth	Hampton
	Seabrook	
	Rye	
Massachusetts	Gloucester	Plymouth
	New Bedford	Dennis
	Boston	Provincetown
	Chatham	Harwichport
	Scituate	Sandwich
		Newburyport
		Barnstable
		Woods Hole
		Marshfield
		Rockport
		Nantucket
Rhode Island	Point Judith	Newport
Connecticut		Stonington
New York		Montauk

6.6.6.2 Primary Port Communities

Information in this section is largely based on demographic data collected by the 2010 US Census and fishery data collected by NMFS, much of which are available on the NEFSC website (NEFSC 2012c). While these data describe a community’s dependence on the groundfish fishery, it is important to remember that at least some of the individual groundfish vessels therein are even more dependent on groundfish.

Portland, Maine. In 2013, Portland had a population 66,318, a 0.2% increase from the year 2010 (61,194; Census 2015). In FY 2013, 14 vessels that hailed from Portland landed groundfish (Table 40). The value of groundfish landings from these vessels was $9.8M in FY 2013, whether they landed in Portland or elsewhere. The value of all groundfish revenue in Portland was $5.4M in FY 2013, indicating that several of the vessels based in Portland landed in other ports, likely in Massachusetts. Since FY 2009, the value of landings in Portland has been less than the value of landings by Portland-based vessels. In FY 2013, 63% of total fisheries revenues of groundfish vessels landing in Portland came from groundfish.

Portland has several dealers, processors, and other shore-side infrastructure that support the groundfish fishery. Opening in 1986, the Portland Fish Exchange is America's first all-display seafood auction. In 2013, the Exchange sold 4.7M pounds of seafood, about 75% of which was groundfish (www.pfex.org). Processors include Bristol Seafood, Channel Fish Processing, Cozy Harbor Seafood, Inc., and North Atlantic, Inc. The Salt and Sea is a community supported fishery is based in Portland.

Portsmouth, New Hampshire. In 2013, Portsmouth had a population of 21,440, a 1.0% increase from the year 2010 (21,233; Census 2015). In FY 2013, eight vessels that hailed from Portsmouth landed groundfish, down from 13 in FY 2009 (Table 41). The value of groundfish landings from these vessels was $1.1M in FY 2013, whether they landed in Portsmouth or elsewhere. The value of all groundfish revenue in Portsmouth was $0.9M in FY 2013, indicating that some vessels based in Portsmouth landed in other ports, likely in Massachusetts or Maine. Since at least FY 2009, the value of landings in Portsmouth has been less than the value of landings by Portsmouth-based vessels. In FY 2013, 35% of total fisheries revenues of groundfish vessels landing in Portsmouth came from groundfish.

In terms of shore-side infrastructure, the Portsmouth Fishermen's Cooperative closed in September 2007. Since then, several Portsmouth fishermen have been landing fish in other ports, though some offloading of groundfish has continued at the State Pier through dealers such as Seaport Fish and through private trucking to dealers out of state. Recently, a local commercial fisherman obtained a dealer's license to help sustain Portsmouth as a landing port. New Hampshire Community Seafood is a community supported fishery based in Portsmouth which was launched in 2012.

Seabrook, New Hampshire. In 2013, Seabrook had a population of 8,749, a 0.6% increase from the year 2010 (8,693; Census 2015). In FY 2012, four vessels that hailed from Seabrook landed groundfish, down from six in FY 2009 (Table 42). The value of these landings was $0.5M, down from $1.2M in FY 2009. Groundfish landings in Seabrook, regardless of the homeport of the vessel were down from $1.4M in FY 2009 to $1.1M in FY 2012. In FY 2012, 61% of total fisheries revenues of groundfish vessels landing in Seabrook came from groundfish. FY 2013 data is considered confidential.

Most of the local vessels are day-boats that land at the Yankee Fisherman's Cooperative, a wholesale and processing facility. The co-op was founded in 1990 by 60 members who fish groundfish, lobster, tuna or shrimp. The co-op also houses a retail market where fresh seafood is sold to the local community.

Rye, New Hampshire. In 2013, Rye had a population of 5,329, a 0.6% increase from the year 2010 (5,298; Census 2015). In FY 2012, nine vessels that hailed from Rye landed groundfish, down from 11 vessels in FY 2009 (Table 43). The value of these landings was $1.2M, down from $1.5M in FY 2009. Groundfish landings in Rye, regardless of the homeport of the vessel were down from $1.3M in FY 2009 to $0.8M in FY 2012. In FY 2012, 66% of total fisheries revenues of groundfish vessels landing in Rye came from groundfish. FY 2013 data is considered confidential.

The Division of Ports and Harbors (DPH) has jurisdiction over a commercial fishing pier in Rye. Due to physical limitations of the pier, the DPH does not allow long-term or overnight berthing. Commercial fishermen must acquire a "Pier Use" permit to use the facility (http://www.portofnh.org/fishing.html).

Gloucester, Massachusetts. In 2013, Gloucester had a population of 29,393, a 2.1% increase from the year 2010 (28,789; Census 2015). In FY 2013, 53 vessels that hailed from Gloucester landed groundfish, down from 96 in FY 2009 (Table 44). The value of groundfish landings from these vessels was $9.4M in FY 2013, whether they landed in Gloucester or elsewhere. The value of all groundfish revenue in Gloucester was $14.6M in FY 2013, indicating that vessels based in other ports landed in Gloucester. Since at least FY 2009, the value of landings in Gloucester has been greater than the value of landings by

Gloucester-based vessels. In FY 2013, 58% of total fisheries revenues of groundfish vessels landing in Gloucester came from groundfish.

The significant amount of landings and revenues, as well as the number of shoreside facilities, indicate that Gloucester is an important port of landing for multispecies vessels. The Cape Ann Seafood Exchange is a wholesale fish auction that employs about 20 people. Processors of groundfish include Channel Fish Processing. Cape Ann Fresh Catch is a community supported fishery is based in Gloucester. Cape Pond Ice Company has provided ice for many Gloucester fishing boats, however recent reductions in fishing effort have reduced demand for large quantities of ice and the company has diversified adding tours and t-shirt sales in an attempt to stay in business. Gloucester has gained some business from Maine vessels which land here due to tightening restrictions at the statewide level in Maine. The Gloucester Fishermen's Wives Association has been active in this community since 1969, with a goal "to help promote a healthy environment and a just economy that allows local and family-owned businesses to survive in a changing world" (GFWA 2014).

Boston, Massachusetts. In 2013, Boston had a population of 645,966, a 4.6% increase from the year 2010 (617,720; Census 2015). In FY 2013, 25 vessels that hailed from Boston landed groundfish, down from 44 in FY 2009 (Table 45). The value of groundfish landings from these vessels was $10.7M in FY 2013, whether they landed in Boston or elsewhere. The value of all groundfish revenue in Boston was $9.3M in FY 2013, indicating that some vessels based in Boston landed in other ports. Since at least FY 2009, the value of landings in Boston has been less than the value of landings by Boston-based vessels. In FY 2013, 78% of total fisheries revenues of groundfish vessels landing in Boston came from groundfish.

These landings as well as the historical importance of Boston as a provider of fishing-related support services for smaller communities indicate that Boston is an important primary community. The high cost of real estate in Boston means that fishermen and other maritime users of waterfront areas face displacement issues. Groups such as the Boston Harbor Association are working to prevent this from happening. There are now only two areas for commercial fishermen to tie-up and unload their catch – Boston Fish Pier and the Cardinal Medeiros docks (used almost exclusively by lobstermen). New England Seafood is located at the Fish Pier. Groundfish processing facilities in Boston include Channel Fish Processing, Foley Fish, and Pier Fish, Co.

Chatham, Massachusetts. In 2013, Chatham had a population of 6,131, a 0.1% increase from the year 2010 (6,125; Census 2015). In FY 2013, 20 vessels that hailed from Chatham landed groundfish, down from 28 in FY 2007 (Table 46). The value of groundfish landings from these vessels was $0.8M in FY 2013, whether they landed in Chatham or elsewhere. In FY 2010 and FY 2011, the value of landings in Chatham was been less than the value of landings by Chatham-based vessels. In FY 2013, 9% of total fisheries revenues of groundfish vessels landing in Chatham came from groundfish. The Chatham Fish Pier is an active offloading facility in Chatham. The Cape Cod Community Supported Fishery is based in West Chatham. Also on the Cape, the Lobster Trap Co., Inc. purchases groundfish from Chatham-based vessels.

New Bedford, Massachusetts. In 2013, New Bedford had a population of 95,078, remaining fairly steady since the year 2010 (95,072; Census 2015). In FY 2013, 31 vessels that hailed from New Bedford landed groundfish, down from 52 in FY 2009 (Table 47). The value of groundfish landings from these vessels was $12.7M in FY 2013, whether they landed in New Bedford or elsewhere. Since at least FY 2009, the value of landings in New Bedford has been greater than the value of landings by New Bedford-based vessels. In FY 2013, 21% of total fisheries revenues of groundfish vessels landing in New Bedford came from groundfish.

New Bedford is also an important port of landing for scallop vessels, and its dependence on the scallop fishery for revenues reduces its overall dependence on the multispecies fishery, although many individual vessels may be more dependent on groundfish. New Bedford, as a fishing community, is less dependent on groundfish for its overall fisheries revenues. Some impacted vessels may have the ability to offset losses in groundfish revenues with revenues from other fisheries. New Bedford has several dealers, processors, and other shore-side infrastructure that support the groundfish fishery. Opening in 1994, the Whaling City Seafood Display Auction is the only seafood auction in Southern New England. Groundfish processors include American Pride Seafoods, Foley Fish, Marder Trawling, Inc., and Pier Fish, Co.

Scituate, Massachusetts. In 2013, Scituate had a population of 18,297, a 0.9% increase from the year 2010 (18,135; Census 2015). In FY 2013, eight vessels that hailed from Scituate landed groundfish, down from 14 in FY 2009. The value of groundfish landings from these vessels, whether they landed in Scituate or elsewhere, was $0.3M in FY 2013, down from $1.6M in FY 2009 (Table 48). The value of groundfish landings in Scituate since FY 2011 has been greater than the value of landings from Scituate based vessels. In FY 2013, 57% of total fisheries revenues of groundfish vessels landing in Scituate came from groundfish.

The Scituate Town Pier, is owned and operated by the town but primarily used by commercial fishermen. There is berthing available for 15, 40-80 foot commercial fishing vessels. The Pier is also used for loading and offloading supplies, and fuel, ice and bait are trucked to the pier (http://www.scituatema.gov/sites/scituatema/files/file/file/harbor_management_plan.pdf). The South Shore Seafood Exchange a community supported fishery, was started in Scituate in 2012. The CSF offers pickup locations as well as home deliveries and sells filleted fish to individuals, families and restaurants.

Point Judith/Narragansett, Rhode Island. Point Judith is considered a village in the town of Narragansett and does not have Census data as it is not incorporated on its own. It is also not a residential town, and fishermen working out of the port live in surrounding communities and all across Rhode Island. In 2013, Narragansett had a population of 15,706, a 1.0% decrease from the year 2010 (15,870; Census 2015). In FY 2013, 30 vessels that hailed from Point Judith landed groundfish, down from 32 in FY 2009 (Table 49). The value of groundfish landings from these vessels was $1.9M in FY 2012, whether they landed in Point Judith or elsewhere. In FY 2013, 7% of total fisheries revenues of groundfish vessels landing in Point Judith came from groundfish.

Groundfish landings and revenues in this community have increased considerably since the 1994 fishing year, suggesting that Point Judith is becoming a more important port of landing for multispecies vessels. Point Judith, as a fishing community, is less dependent on groundfish for its overall fisheries revenues. Some impacted vessels may have the ability to offset losses in groundfish revenues with revenues from other fisheries. Many of Point Judith’s vessels are actively involved in fisheries in the Mid-Atlantic region (squid, fluke, etc.). However, increasing reliance on groundfish in recent years suggests that vessels may have more difficulty shifting effort as restrictions in these other fisheries increase and opportunities decrease. Groundfish processors located in Warwick likely serve fishermen offloading in Point Judith, including Gardner’s Wharf Seafood and Great Northern Products, Ltd.

Table 40 - Groundfish fishery in Portland, ME

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	14	14	15	16	14
Value of landings of groundfish by home port ($M)	8.3	10.6	10.1	9.3	9.8
Value of landings of groundfish by port of landing ($M) [B]	5.1	3.5	4.8	6.8	5.4
Value of landings of all species by groundfish vessels by home port ($M)	10.5	12.9	12.7	12.2	12.9
Value of landings of all species by groundfish vessels by port of landing ($M)	7.4	6.2	7.2	9.5	8.6

[A] “Active” defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Portland.
Source: Murphy (2015), all landings are reported in 2010 dollars.

Table 41 - Groundfish fishery in Portsmouth, NH

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	13	9	9	8	8
Value of landings of groundfish by home port ($M)	2.0	1.2	1.4	1.4	1.1
Value of landings of groundfish by port of landing ($M) [B]	1.4	1.2	1.6	1.4	0.9
Value of landings of all species by groundfish vessels by home port ($M)	3.2	2.6	2.8	2.6	2.3
Value of landings of all species by groundfish vessels by port of landing ($M)	3.1	3.2	3.3	3.1	2.6

[A] “Active” defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Portsmouth.
All landings are reported in 2010 dollars.

Table 42 - Groundfish Fishery in Seabrook, NH

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	6	5	5	4	c
Value of landings of groundfish by home port ($M)	1.2	0.9	1.1	0.5	c
Value of landings of groundfish by port of landing ($M) [B]	1.4	1.1	1.4	1.1	c
Value of landings of all species by groundfish vessels by home port ($M)	1.6	1.4	1.5	1.0	c
Value of landings of all species by groundfish vessels by port of landing ($M)	2.1	1.8	2.1	1.8	c

[A] “Active” defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Seabrook.
All landings are reported in 2010 dollars. C = confidential data

Table 43 - Groundfish fishery in Rye, NH

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	11	9	9	9	c
Value of landings of groundfish by home port ($M)	1.5	1.0	1.4	1.2	c
Value of landings of groundfish by port of landing ($M) [B]	1.3	0.9	1.3	0.8	c
Value of landings of all species by groundfish vessels by home port ($M)	2.4	2.0	2.2	2.4	c
Value of landings of all species by groundfish vessels by port of landing ($M)	1.9	1.6	1.8	1.2	c

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Rye.
All landings are reported in 2010 dollars. C = confidential data

Table 44 - Groundfish fishery in Gloucester, MA

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	96	75	69	61	53
Value of landings of groundfish by home port ($M)	16.9	16.8	16.6	13.6	9.4
Value of landings of groundfish by port of landing ($M) [B]	30.0	27.6	29.5	20.6	14.6
Value of landings of all species by groundfish vessels by home port ($M)	23.8	25.0	25.8	21.6	17.1
Value of landings of all species by groundfish vessels by port of landing ($M)	39.6	39.9	42.4	31.1	25.2

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Gloucester.
Source: Murphy (2015), all landings are reported in 2010 dollars.

Table 45 - Groundfish fishery in Boston, MA

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	44	35	30	28	25
Value of landings of groundfish by home port ($M)	13.8	14.4	17.0	12.6	10.7
Value of landings of groundfish by port of landing ($M) [B]	8.9	11.3	11.5	10.0	9.3
Value of landings of all species by groundfish vessels by home port ($M)	26.8	27.8	30.9	26.4	25.1
Value of landings of all species by groundfish vessels by port of landing ($M)	11.2	13.8	14.0	12.0	12.0

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Boston.
Source: Murphy (2015), all landings are reported in 2010 dollars.

Table 46 - Groundfish fishery in Chatham, MA

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	28	26	25	23	20
Value of landings of groundfish by home port ($M)	2.8	2.4	2.5	0.9	0.8
Value of landings of groundfish by port of landing ($M) [B]	3.2	2.2	2.3	1.0	0.7
Value of landings of all species by groundfish vessels by home port ($M)	6.4	6.5	8.8	6.6	8.1
Value of landings of all species by groundfish vessels by port of landing ($M)	8.0	7.5	9.0	7.2	8.1

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Chatham.
Source: Murphy (2015), all landings are reported in 2010 dollars.

Table 47 - Groundfish fishery in New Bedford, MA

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	52	33	37	36	31
Value of landings of groundfish by home port ($M)	16.3	18.6	20.7	14.9	12.7
Value of landings of groundfish by port of landing ($M) [B]	23.7	29.1	29.9	20.7	18.7
Value of landings of all species by groundfish vessels by home port ($M)	59.5	65.4	76.5	67.9	58.1
Value of landings of all species by groundfish vessels by port of landing ($M)	83.8	93.9	105.2	99.8	87.8

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in New Bedford.
Source: Murphy (2015), all landings are reported in 2010 dollars.

Table 48 - Groundfish fishery in Scituate, MA

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	14	8	9	9	8
Value of landings of groundfish by home port ($M)	1.6	0.9	0.9	0.9	0.3
Value of landings of groundfish by port of landing ($M) [B]	2.3	0.8	1.1	1.3	0.8
Value of landings of all species by groundfish vessels by home port ($M)	2.5	1.8	1.6	2.4	1.5
Value of landings of all species by groundfish vessels by port of landing ($M)	3.2	1.8	1.8	2.5	1.4

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Scituate.
All landings are reported in 2010 dollars.

Table 49 - Groundfish fishery in Point Judith, RI

	FY09	FY10	FY11	FY12	FY13
Active groundfish vessels in this homeport(#) [A]	32	31	28	33	30
Value of landings of groundfish by home port ($M)	2.3	2.4	2.0	1.8	1.9
Value of landings of groundfish by port of landing ($M) [B]	2.3	2.1	2.1	1.8	2.1
Value of landings of all species by groundfish vessels by home port ($M)	19.6	22.8	27.8	24.9	26.0
Value of landings of all species by groundfish vessels by port of landing ($M)	21.2	24.7	30.4	26.0	30.0

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Point Judith.
All landings are reported in 2010 dollars.

6.6.6.3 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 (Clay et al. 2007; NMFS 2010c; Olson & Clay 2001; Thunberg 2007).

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. In FY 2013, vessels with limited access groundfish permits provided 2,046 crew positions, with 48% coming from vessels with homeports in Massachusetts (Table 50). Since at least FY 2009, the total number of crew positions provided by limited access groundfish vessels has declined by 15.6%. Changes in crew positions vary across homeport states. Overall, most states lost crew positions in FY 2013, although New Jersey added a few positions.

A crew day[20] is a measure of employment that incorporates information about the time spent at sea earning a share of the revenue. 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 FY 2013, vessels with limited access groundfish permits used 157,601 crew days, with 47% coming from vessels with homeports in Massachusetts (Table 50). Since at least FY 2009, the total number of crew days used by limited access groundfish vessels across the Northeast has declined, though Rhode Island had an increase in crew days in FY 2013. 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

[20] Similar to a "man-hour," a "crew day" is calculated by multiplying a vessel's crew size by the days absent from port. Since the number of trips affects the crew-days indicator, the indicator is also a measure of work opportunity.

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.

Table 50 - Number of crew positions and crew days on active vessels by homeport and state

Home Port State		FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
CT	Total crew positions	40	37	42	39	39
	Total crew days	3,700	4,020	3,002	4,478	3,551
MA	Total crew positions	1,231	1,140	1,071	1,050	987
	Total crew days	95,685	83,235	85,747	81,696	73,518
ME	Total crew positions	266	244	222	242	228
	Total crew days	15,539	15,596	14,910	16,524	15,237
NH	Total crew positions	110	108	106	95	86
	Total crew days	5,407	3,929	4,987	5,166	4,487
NJ	Total crew positions	162	150	144	149	153
	Total crew days	10,865	10,093	9,893	10,349	9,564
NY	Total crew positions	219	208	217	208	191
	Total crew days	16,997	15,763	16,046	15,028	14,372
RI	Total crew positions	267	256	247	232	226
	Total crew days	26,411	26,822	25,147	24,247	25,645
Other Northeast	Total crew positions	131	129	131	136	131
	Total crew days	12,615	11,818	11,610	11,640	11,227
Total	**Total crew positions**	**2,424**	**2,275**	**2,179**	**2,145**	**2,046**
	Total crew days	**187,219**	**171,277**	**171,343**	**169,128**	**157,601**

Source: Murphy (2014, 2015)

6.6.7 Consolidation and Redirection

The multiple regulatory constraints placed on common pool groundfish fishermen are intended to control their effort and catch per unit effort (CPUE) as a means to limit mortality. Exemptions to many of these controls, which have been granted to sectors, may increase the CPUE of sector participants. As a result, sector fishermen may have additional time that they could direct towards non-groundfish stocks that they otherwise would not have pursued, resulting in redirection of effort into other fisheries. Additionally, to maximize efficiency, fishermen within a single sector may be more likely to allocate fishing efforts such that some vessels do not fish at all. This is referred to as fleet consolidation.

Both redirection and consolidation have been observed when management regimes for fisheries outside the Northeast US shifted toward a catch share management regime such as sectors. For example, research following the rationalization of the halibut and sablefish fisheries by the North Pacific Fishery Management Council found individuals who received enough quota shares were able to continue fishing with less competition, greater economic certainty, and over a longer fishing season (Matulich & Clark 2001). However, individuals who did not receive enough of a catch share either bought or leased catch shares from other fishermen or sold their quota. Similarly, one year after implementation of the Bering Sea-Aleutian Island crab fishery Individual Transferable Quota (ITQ), a study found that about half of the vessels that fished the 2004/2005 Bering Sea Snow Crab fishery did not fish the following year. However, research on the ITQ plan for the British Columbia halibut fishery found efficiency gains were greatest during the first round of consolidation, and little incentive to increase efficiency (or continue consolidation) existed afterward (Pinkerton & Edwards 2009). The scope of consolidation and redirection of effort that may be expected to result from sector operations in FY2014 is difficult to predict.

6.6.8 Regulated Groundfish Stock Catch

The Northeast Multispecies FMP specifies Annual Catch Limits (ACLs) for 20 stocks. Exceeding an ACL for a stock results in the implementation of Accountability Measures (AMs) to prevent overfishing. The ACL is sub-divided into different components. Those components that are subject to AMs are referred to as sub-ACLs. There are also components of the fishery that are not subject to AMs. These include state waters catches that are outside of federal jurisdiction, and a category referred to as "other sub-components" that combines small catches from various fisheries.

Table 51 - FY2014 Northeast Multispecies Percent of Annual Catch Limit Caught (%)

Stock	Components with ACLs and sub-ACLs: With Accountability Measures (AMs)								Sub-components: No AMs	
	Total	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	81.1	78.4	78.6	65.8					99.5	138.5
GOM Cod	94.9	97.8	80.5	57.1	128.3				37.1	136.5
GB Haddock	34.8	31.7	32.0	0.7		70.1			4.2	103.1
GOM Haddock	159.0	161.5	75.0	21.6	380.7				47.9	207.7
GB Yellowtail Flounder	38.6	24.5	24.9	1.4			116.4	18.1	NA	0.2
SNE Yellowtail Flounder	74.7	71.0	67.7	85.7			98.2		8.9	111.7
CC/GOM Yellowtail Flounder	64.1	52.3	53.9	6.3					139.2	354.6
Plaice	93.1	94.1	95.3	31.3					57.9	78.6
Witch Flounder	83.1	84.5	86.0	9.6					162.8	60.0
GB Winter Flounder	34.2	34.0	34.2	0.1					NA	40.6
GOM Winter Flounder	23.1	17.4	18.1	1.9					41.7	6.0
SNE/MA Winter Flounder	43.6	45.1	46.1	37.9					30.3	51.5
Redfish	43.5	44.4	44.5	11.4					15.8	19.0
White Hake	46.6	40.9	41.0	28.6					3.3	331.7
Pollock	31.1	30.4	30.2	52.6					56.6	17.4
Northern Windowpane	187.5	160.9	NA	NA					180.5	248.6
Southern Windowpane	90.8	94.4	NA	NA			76.5		42.7	117.1
Ocean Pout	54.6	16.8	NA	NA					163.9	393.5
Halibut	74.2	83.9	NA	NA					65.9	38.8
Wolffish	23.1	23.0	NA	NA					97.9	5.9

Source: NMFS Greater Atlantic Regional Fisheries Office, September 30, 2015, run date of June 16, 2015

Table 52 - FY 2014 Northeast Multispecies Total Catch (mt)

Stock	**Total Catch**	Groundfis h Fishery	Sector	Common Pool	Recreationa l	Midwater Trawl Herring Fishery	Scallop Fishery[1]	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	1,514.4	1,386.3	1,364.3	22.0					19.5	108.6
GOM cod	1,394.9	1,286.5	652.2	11.1	623.3				38.2	70.2
GB Haddock	6,364.0	5,449.1	5,448.3	0.8		113.5			8.1	793.4
GOM Haddock	1,019.2	983.3	323.8	0.9	658.6	-			4.8	31.1
GB Yellowtail Flounder	122.8	62.5	62.4	0.1			59.3	1.1	-	0.0
SNE/MA Yellowtail Flounder	497.1	400.4	313.0	87.4			64.8		0.6	31.3
CC/GOM Yellowtail Flounder	335.1	250.5	249.4	1.0					45.8	38.9
Plaice	1,342.3	1,300.9	1,292.8	8.1					17.5	23.8
Witch Flounder	624.0	515.4	514.2	1.2					38.3	70.4
GB Winter Flounder	1,193.2	1,149.3	1,149.3	0.0					-	43.8
GOM Winter Flounder	240.8	124.3	123.7	0.6					113.3	3.2
SNE/MA Winter Flounder	703.2	545.8	489.9	55.9					71.1	86.3
Redfish	4,748.4	4,686.9	4,681.9	5.0					18.1	43.5
White Hake	2,058.2	1,748.7	1,740.1	8.5					1.5	308.0
Pollock	4,753.7	4,016.4	3,971.6	44.8					542.9	194.4
Northern Windowpane	269.3	157.7	157.4	0.3					2.7	108.9
Southern Windowpane	478.0	96.3	68.2	28.1			140.0		23.4	218.2
Ocean Pout	120.2	33.1	30.8	2.3					3.9	83.2
Halibut	78.6	47.8	45.9	1.9					28.7	2.1
Wolffish	15.1	14.3	14.3	-					0.7	0.2

Table 53 - FY2014 Northeast Multispecies Other Sub-Component Catch Detail (mt)

Stock	Total Catch	SCALLOP[1]	FLUKE	HAGFISH	HERRING	LOBSTER/ CRAB	MENHADEN	MONKFISH	RESEARCH	SCUP
GB cod	108.6	8.4	0.1	0.1	0.2	12.8	0.0	0.7	3.1	0.1
GOM cod	70.2	0.1	-	-	0.1	67.4	-	0.0	0.5	-
GB Haddock	793.4	5.5	31.1	-	40.1*	0.8	0.5	0.1	5.6	38.3
GOM Haddock	31.1	0.1	0.0	-	7.5*	0.0	-	0.0	1.9	-
GB Yellowtail Flounder	0.0	-*	0.0	-	-*	-	-	-	-	-
SNE Yellowtail Flounder	31.3	-*	3.1	-	0.6	0.0	0.0	0.2	2.3	3.7
CC/GOM Yellowtail	38.9	33.8	0.0	-	0.6	0.3	-	0.0	0.7	-
Plaice	23.8	5.0	2.9	-	0.3	0.0	0.0	0.0	0.5	3.6
Witch Flounder	70.4	26.4	3.2	-	1.6	0.1	0.0	0.0	0.0	3.9
GB Winter Flounder	43.8	37.5	0.0	-		-	-	-	-	-
GOM Winter Flounder	3.2	1.5	0.0	-	0.0	0.0	-	0.0	0.2	-
SNE Winter Flounder	86.3	33.3	6.4	-	0.9	0.1	0.0	0.1	3.6	5.7
Redfish	43.5	0.1	0.1		1.7	8.5	0.0	0.0	31.8	0.1
White Hake	308.0	1.2	1.1	-	0.4	288.9	0.0	0.1	1.2	1.1
Pollock	194.4	0.0	0.1	-	0.2	0.1	0.0	0.0	5.7	0.1
Northern Windowpane	108.9	99.7	0.0	-	0.0	7.4	-	0.0	0.0	-
Southern Windowpane	218.2	-*	47.2	-	2.3	0.1	0.0	0.3	0.0	58.1
Ocean Pout	83.2	1.5	3.0	-	0.5	61.8	0.0	0.0	0.0	3.7
Halibut	2.1	0.4	0.0		0.0	1.0	0.0	0.1	0.1	0.0
Wolffish	0.2	0.0				0.0		0.0	0.0	

Continued.

Stock	SHRIMP	SQUID	SQUID/ WHITING	SURFCLAM	TILEFISH	WHELK/ CONCH	WHITING	UNKNOWN	RECREATIONAL
GB cod	0.0	1.2	0.9	0.1	-	1.0	0.0	4.1	75.9
GOM cod	0.0	0.0	0.1	0.0	-	-	0.1	1.8	-*
GB Haddock	6.3	194.8	149.5	23.6	-	-	0.1	297.2	-
GOM Haddock	0.1	0.0	3.4	2.3	-	-	9.4	6.4	-*
GB Yellowtail Flounder	-	-*	-*	-	-	-	-	0.0*	
SNE Yellowtail Flounder	0.1	3.9	2.0	0.6	-	-	0.0	14.7	
CC/GOM Yellowtail Flounder	0.0	0.0	0.6	0.0	-	-	0.7	2.1	
Plaice	0.1	2.0	1.8	0.2	-	-	0.0	7.3	
Witch Flounder	0.3	10.3	8.1	0.6	-	-	0.2	15.6	
GB Winter Flounder	-	0.0	5.3	-	-	-	-	1.0	
GOM Winter Flounder	0.0	0.0	0.0	0.0	-	-	0.0	1.1	0.3
SNE Winter Flounder	0.2	6.6	3.2	0.6	-	-	0.0	21.0	4.7
Redfish	0.0	0.2	0.2	0.1	-		0.0	0.6	
White Hake	0.1	2.8	4.6	0.2	0.0		0.1	6.0	
Pollock	0.0	0.1	0.1	0.0	-		0.0	0.6	187.4
Northern Windowpane	0.0	0.0	1.0	0.0	-		0.1	0.6	
Southern Windowpane	0.3	12.2	10.9	4.6			0.0	82.2	
Ocean Pout	0.1	2.7	2.4	0.3			0.1	7.2	
Halibut	0.0	0.0	0.0	0.0			0.0	0.4	
Wolffish				0.0				0.1	

Source: NMFS Greater Atlantic Regional Fisheries Office. September 30, 2015.

6.6.9 Fishery Sub-Components

6.6.9.1 Sector Harvesting Component

In FY2010, the sector vessels landed the overwhelming majority of the groundfish ACL. Each sector receives a total amount of fish it can harvest for each stock, its Annual Catch Entitlement (ACE). Since the ACE is dependent on the amount of the ACL in a given fishing year, the ACE may be higher or lower from year to year even if the sector's membership remains the same. There have been substantial shifts in commercial groundfish sub-ACLs for various stocks between FY2010 and FY2014. There has been a general decrease in trips, and catch for sector vessels, and there has been a shift in effort out of the groundfish fishery into other fisheries. However, these changes may correlate to a certain extent with the decrease in ACL.

Combined, 142.3 million (live) pounds of ACE were allotted to the sectors in 2013 but only 47.3 million (live) pounds were landed. Of the 16 ACEs allocated to sectors in 2013, 6 stocks approached the catch limit (>80% conversion) set by the total allocated ACE (Table 54). This represents a sizeable improvement from 2012 when the fleet caught over 80% of the allocation for only 1 stock. Overall, the fleet landed 33% of the total allocated ACE in 2013. As has been the case in previous years, Georges Bank haddock accounted for a majority of the unrealized landings. Collectively, East and West GB haddock, comprises almost 41% of total allocated ACE, yet only 14% of total catch. In general, total allocations have decreased since 2010 and total catch has never been above 41% of the allocation.

Table 54 –Annual catch entitlement (ACE) and catch (live pounds)

	2010			2011		
	Allocated ACE	**Catch**	**% caught**	**Allocated ACE***	**Catch**	**% caught**
Cod, GB East	717,441	562,610	78%	431,334	357,578	83%
Cod, GB West	6,563,099	5,492,557	84%	9,604,207	6,727,837	70%
Cod, GOM	9,540,389	7,991,172	84%	1,242,220	9,561,153	85%
Haddock, GB East	26,262,695	4,122,910	16%	21,122,565	2,336,964	11%
Haddock, GB West	62,331,182	13,982,173	22%	50,507,974	6,101,400	12%
Haddock, GOM	1,761,206	819,069	47%	1,796,740	1,061,841	59%
Plaice	6,058,149	3,305,950	55%	7,084,289	3,587,356	51%
Pollock	35,666,741	11,842,969	33%	32,350,451	16,297,273	50%
Redfish	14,894,618	4,647,978	31%	17,369,940	5,951,045	34%
White hake	5,522,677	4,687,905	85%	6,708,641	6,598,273	98%
Winter flounder, GB	4,018,496	3,036,352	76%	4,679,039	4,241,177	91%
Winter flounder, GOM	293,736	178,183	61%	750,606	343,152	46%
Winter flounder, SNE	Not allocated			Not allocated		
Witch flounder	1,824,125	1,528,215	84%	2,839,697	2,178,941	77%
Yellowtail flounder, CC/GOM	1,608,084	1,268,961	79%	2,185,802	1,743,168	80%
Yellowtail flounder, GB	1,770,451	1,625,963	92%	2,474,662	2,176,921	88%
Yellowtail flounder, SNE	517,372	340,662	66%	963,033	795,267	83%
Grand Total	**179,350,461**	**65,433,630**	**36%**	**172,111,201**	**70,059,346**	**41%**

	2012			2013		
	Allocated ACE*	**Catch**	**% caught**	**Allocated ACE***	**Catch**	**% caught**
Cod, GB East	349,326	146,887	42%	199,323	73,389	37%
Cod, GB West	0,320,365	3,331,816	32%	3,752,891	3,316,562	88%
Cod, GOM	8,761,312	4,699,621	54%	1,804,615	1,582,637	88%
Haddock, GB East	5,074,308	777,622	5%	8,249,383	1,276,136	15%
Haddock, GB West	9,398,411	1,808,495	4%	49,856,979	5,225,246	10%
Haddock, GOM	1,784,067	522,917	29%	412,428	368,570	89%
Plaice	7,400,614	3,426,646	46%	3,102,789	3,062,787	99%
Pollock	9,305,283	13,688,091	47%	28,481,182	10,569,073	37%
Redfish	19,052,388	9,096,051	48%	22,454,069	8,782,342	39%
White hake	7,365,297	5,294,489	72%	8,500,901	4,469,611	53%
Winter flounder, GB	7,695,773	4,237,884	55%	7,805,363	3,796,436	49%
Winter flounder, GOM	1,561,490	562,334	36%	1,531,079	367,701	24%
Winter flounder, SNE	Not allocated			2,367,913	1,477,896	62%
Witch flounder	3,291,703	2,122,567	64%	1,333,163	1,398,494	105%
Yellowtail flounder, CC/GOM	2,433,611	2,067,901	85%	1,035,799	823,535	80%
Yellowtail flounder, GB	798,315	474,236	59%	336,532	122,911	37%
Yellowtail flounder, SNE	1,342,708	938,303	70%	1,084,646	621,470	57%
Grand Total	**165,934,970**	**53,195,859**	**32%**	**142,309,054**	**47,334,794**	**33%**

6.6.9.2 Common Pool Harvesting Component

With the adoption of Amendment 16, most commercial groundfish fishing activity occurs under sector management regulations. Some vessels have elected to not join sectors, and continue to fish under the effort control system. Collectively, this part of the fishery is referred to as the “common pool.” These vessels fish under both limited access and open access groundfish fishing permits. Common pool vessels accounted for only a small amount of groundfish catch in FY2013 (Table 55). The largest common pool catch (pollock, 67.8 mt) was only 0.8% of the total groundfish fishery catch of this stock. Common pool vessels caught 0.8% of the GOM cod and 0.2% of the GOM haddock groundfish fishery catch.

Common pool vessels with limited access permits landed 1.3M lbs. (landed lbs.) of regulated groundfish in FY2010, worth over $2M in ex-vessel revenues (Table 55). Landings declined to 530K lbs., worth about $840,000 in FY2011and declined again in FY2012 to 355K lbs., worth $606,000. In FY2013, groundfish landings and revenue from common pool vessels rose to 636Klbs, worth just over $1M. Most common pool vessel groundfish fishing activity takes place in the state of Massachusetts. From FY2011 to FY2013, the activity from Maine, Massachusetts and New Hampshire ports declined dramatically (Table 57). The primary ports for this activity over the last 3 years (FY2011-2013) is Gloucester although the ports of Portland, New Bedford, Point Judith and Montauk have also been involved to varying degrees (Table 58).

Table 55 - Common Pool Revenue and Landings FY2010 - FY2013

ALL TRIPS	2010	2011	2012	2013
Groundfish Gross Revenue	$2,046,238	$838,386	$606,102	$1,008,645
Non-groundfish Gross Revenue	$94,530,850	$93,669,874	$92,777,213	$84,984,976
Total Gross Revenue	$96,577,088	$94,508,260	$93,383,315	$85,993,622
Groundfish Landed	1,296,835	529,883	354,699	635,968
Non-groundfish landed	76,497,646	84,455,968	81,876,291	77,136,496
Total Pounds Landed	77,794,481	84,985,851	82,230,990	77,772,463
GROUNDFISH TRIPS				
Groundfish Gross Revenue	$2,035,934	$776,238	$567,606	$947,679
Non-groundfish Gross Revenue	$4,416,742	$5,570,486	$3,089,055	$1,440,920
Total Gross Revenue	$6,452,676	$6,346,725	$3,656,661	$2,388,599
Groundfish Landed	1,289,380	482,696	333,808	590,007
Non-groundfish landed	4,770,095	5,022,273	3,066,950	1,782,623
Total Pounds Landed	6,059,475	5,504,969	3,400,758	2,372,630
*All revenue listed in 2010 constant dollars. Landings are in landed pounds.				

Table 56 - Common pool permits landing groundfish

	A	C	D	E	HA	Total
2011	61	6	3	12	31	114
2012	58	6		8	25	99
2013	59	5		10	29	106
Notes: Confidential data excluded.						

Table 57 - Common pool groundfish landings by state of trips (landed lbs).

	FY2011	FY2012	FY2013
MA	381,606	163,846	94,358
ME	49,559	48,860	34,628
NH	25,912	28,448	6,537
NJ	19,060	20,628	56,271
NY	38,843	58,594	64,941
RI	12,248	31,944	287,011

Note: Confidential data removed

Table 58 - Common pool groundfish landings by port (landed lbs).

Port	FY2011	FY2012	FY2013
Gloucester, MA	269,671	144,615	50,166
Point Judith, RI	4,708	13,161	270,684
Montauk, NY	19,622	54,475	61,857
Portland, ME	40,520	34,054	c
New Bedford, MA	39,884	c	c

The primary groundfish stocks landed by common pool vessels in 2011 include GOM cod, GB cod, and pollock. In 2013 primary stocks included SNE yellowtail flounder and SNE winter flounder (Table 59). GB haddock was an important component in FY2010 but not in FY2011 or FY2012. Vessels using HA permits on groundfish trips primarily target GB and GOM cod, GOM haddock, and pollock.

For the common pool permits that landed at least one pound of regulated groundfish in FY2011, FY2012 or FY2013, groundfish revenues were a major portion of revenues on groundfish fishing trips. In FY2011 and FY2013 Groundfish revenues were 60% or more of the trip revenues for 55% of these vessels; in FY2012 this was only true for 38% of these vessels.

Table 59 - Common pool landings (landed lbs) by permit category and stock.

FY2011 Landings	A	C	D	E	HA	Total
GB Cod W	102,450	3,186	168		15,577	121,381
GB Cod E						
GOM Cod	53,984	18,816	2,666		54,982	130,448
GB Haddock W	33,053				85	33,138
GOM Haddock	1,945	161			763	2,869
GB Yellowtail Flounder	3,944			1,521		5,465
SNE Yellowtail Flounder	25,272					25,272
CC/GOM Yellowtail Flounder	23,408	66		19		23,493
Plaice	10,213	686				10,899
Witch Flounder	9,448	972				10,420
GB Winter Flounder	2,411					2,411
GOM Winter Flounder	5,257	374				5,631
SNE/MA Winter Flounder	816					816
Redfish	7,208	38			147	7,393
White Hake	19,901	2,890			177	22,968
Pollock	89,533	4,653			7,644	101,830
Northern Windowpane	850					850
Southern Windowpane	8,607					8,607
Halibut					1,065	1,065
Total	398,3000	31,842	2,834	1,540	79,375	513,891
FY2012 Landings	**A**	**C**	**D**	**E**	**HA**	**Total**
GB Cod W	38,725	266			9,428	48,419
GOM Cod	13,209	22,379			8,983	44,571
GB Haddock W	13,373					13,373
GOM Haddock	1,117	420			470	2,007
GB Yellowtail Flounder	758			1,550		2,308
SNE Yellowtail Flounder	77,293			285		77,578
CC/GOM Yellowtail Flounder	876	799				1,675
Plaice	4,028	1,443				5,471
Witch Flounder	3,671	795				4,466
GB Winter Flounder	1,626					1,626
GOM Winter Flounder	669	1,775				2,444
SNE Winter Flounder	278					278
Redfish	11,678	253			25	11,956
White Hake	19,936	10,586			160	30,682
Pollock	92,614	14,221			3,122	109,957
Southern Windowpane	940					940
Ocean Pout		18				18
Halibut	218					218
Total	281,010	52,955		1,835	22,188	357,987

FY2013 Landings	A	C	D	E	HA	Total
GB Cod W	45,708	77			8,947	54,732
GOM Cod	2,588	6,437			4,327	13,352
GB Haddock W	28,946				111	29,057
GOM Haddock	46	40			2,367	2,453
GB Yellowtail Flounder				396		398
SNE Yellowtail Flounder	199,543			186		199,729
CC/GOM Yellowtail Flounder	6,640	71		28		6,739
Plaice	2,065	3,973				6,038
Witch Flounder	5,066	1,290				6,356
GB Winter Flounder						
GOM Winter Flounder	782	157				939
SNE Winter Flounder	250,266					250,266
Redfish	7,360	222			98	7,680
White Hake	7,719	1,410			76	9,205
Pollock	26,773	1,880			5,802	34,455
Southern Windowpane	89				82	171
Ocean Pout						
Halibut	161	106				267
Total	583,752	15,663		610	21,810	621,835

Note: Confidential data removed. Totals do not include confidential data.

6.6.9.3 Recreational Harvesting Component

The recreational fishery includes private anglers, party boat operators, and charter vessel operators. Several groundfish stocks are targeted by the recreational fishery, including GOM cod, GOM haddock, pollock, and GOM winter flounder. GB cod and haddock are targeted as well, but to a lesser extent. SNE/MA winter flounder is also a target species. Amendment 16 (Section 6.2.5, NEFMC 2009) included a detailed overview of recreational fishing activity.

Recreational removals of GOM cod declined significantly from FY 2013 to FY 2015, largely due to a prohibition of the possession of GOM cod in FY 2015 (Table 60). Removals of GOM haddock varied the time series, increasing FY2014 before falling sharply in FY 2015 (Table 60). The number angler trips in the GOM declined by 46% between FY 2014 and FY 2015 (Table 60). Table 61 provides a breakdown of all angler trips in the GOM for FY 2013 – FY 2015. Note that these values are larger than the angler trip numbers presented in Table 60 because not all angler trips in the GOM target cod and/or haddock. Table 62 provides a breakdown of the number of vessels active in the for-hire component of the recreational fishery.

Table 60 - Gulf of Maine Recreational Catch estimates by Fishing Year[1]

	FY2013	FY2014	FY2015[3]	% Change 2014-2015
Angler Trips[2]	254,949	208,737	112,271	-46%
Cod Catch (numbers, a+b1+b2)	993,486	817,000	385,437	-53%
Cod Kept (numbers, a+b1)	381,181	224,399	5,293	-98%
Cod Released (numbers, b2)	612,306	592,601	380,144	-36%
Cod Removals (numbers, a+b1+(0.15*b2))	473,027	313,289	62,315	-80%
Cod Removals (weight[4], mt)	779	619	69	-89%
Cod Avg. Catch Per Trip (numbers)	3.9	3.9	3.4	
Cod Avg. Kept Per Trip (numbers)	1.5	1.1	0.05	
Cod Avg. Released Per Trip (numbers)	2.4	2.8	3.4	
Cod Avg. Weight of Kept Fish (weight[4], lbs)	4.1	5.4	2.6	
Haddock Catch (numbers, a+b1+b2)	772,601	1,021,004	567,613	-44%
Haddock Kept (numbers, a+b1)	165,028	173,974	165,298	-5%
Haddock Released (numbers, b2)	607,574	847,030	402,316	-53%
Haddock Removals (numbers, a+b1+(0.5*b2))	468,815	597,489	366,456	-39%
Haddock Removals (weight[4], mt)	549	646	301	-53%
Haddock Avg. Angler Catch Per Trip (numbers)	3.0	4.9	5.1	
Haddock Avg. Angler Kept Per Trip (numbers)	0.6	0.8	1.5	
Haddock Avg. Angler Released Per Trip (numbers)	2.4	4.1	3.6	
Haddock Avg. Weight of Kept Fish (weight[4], lbs)	1.8	1.7	2.5	

[1]Source: Available MRIP data as of October 22, 2015

[2]Angler trips = number of angler trips that targeted and/or caught cod or haddock

[3]Data available for wave's 3 and 4 in FY2015. Data from wave 2, 2015 and wave's 5 and 6, 2014 used as proxies.

[4]All weights are based on round weights calculated from MRIP length frequencies and length to weight equations used in the assessments.

Table 61 - All GOM Angler Trips by Fishing Year and Mode

	Angler Trips			
Mode	FY2013	FY2014	FY2015[2]	% Change 2014 to 2015
Headboat	159,243	129,249	78,575	-39%
Charterboat	99,516	107,999	59,626	-45%
Privateboat	1,607,871	1,323,438	986,040	-25%
Shore	734,628	761,359	926,484	22%
	2,601,258	2,322,046	2,050,724	-12%

[1]Angler trips = all angler trips in Gulf of Maine

[2]Data available for wave's 3 and 4 in FY2015. Data from wave 2, 2015 and wave's 5 and 6, 2014 used as proxies.

Table 62 - For-hire recreational vessels catching cod or haddock from the Gulf of Maine

Calendar Year	Party	Charter	Total
1999	53	100	153
2000	48	103	151
2001	59	116	175
2002	43	130	173
2003	53	128	181
2004	64	124	188
2005	60	135	195
2006	62	126	188
2007	52	133	185
2008	54	128	182
2009	48	131	179
2010	60	135	195
2011	47	128	175
2012	44	108	152
2013	31	89	120

Notes: Includes catch (kept and discarded) from any of the Gulf of Maine statistical areas.
Source: GARFO, January 2014.

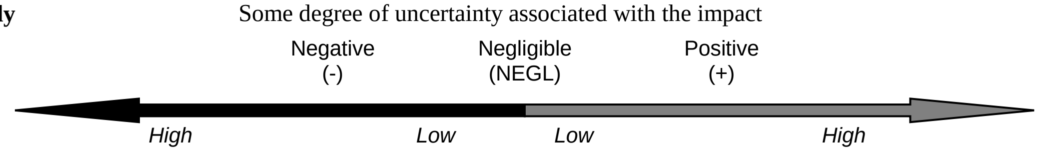
7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

Evaluation Criteria

This EA evaluates the potential impacts using the criteria outlined in Table 63. Impacts for all alternatives are judged relative to the baseline conditions, as described in Section 6.0, and compared to each other.

Table 63 - Impact designations in this document are defined generally as positive, negligible/neutral, and negative.

	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible/Neutral**
Allocated target species, other landed species, and protected resources	Actions that increase stock/population size for stocks in rebuilding. For stocks that are rebuilt, actions that maintain stock population sizes at rebuilt levels. For protected resources, actions that increase the population size, or decrease gear interactions.	Actions that decrease stock/population sizes for overfished stocks. Actions that would cause a rebuilt stock to become overfished. For protected resources, actions that decrease the population size, or increase or maintain gear interactions..	Actions that have little or no positive or negative impacts to stocks/populations
Physical Environment/ Habitat/EFH	Actions that improve the quality or reduce disturbance of habitat	Actions that degrade the quality or increase disturbance of habitat	Actions that have no positive or negative impact on habitat quality
Human Communities	Actions that increase revenue and social well-being of fishermen and/or associated businesses	Actions that decrease revenue and social well-being of fishermen and/or associated businesses	Actions that have no positive or negative impact on revenue and social well-being of fishermen and/or associated businesses
	Impact Qualifiers:		
All VECs: Mixed	**both positive and negative**		
Low (L, as in low positive or low negative)	To a lesser degree		
High (H; as in high positive or high negative)	To a substantial degree (not significant)		
Likely	Some degree of uncertainty associated with the impact		



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. The impacts associated with the measures are anticipated to not be significant.

Throughout this section, impacts are often evaluated using an analytic technique that projects future stock size based on a recent age-based assessment. These projections are known to capture only part of the uncertainties that are associated with the assessments projections. There is evidence, that in the case of multispecies stocks, that the projections tend to be optimistic when they extend beyond a short-term period (i.e., 1-3 years). This means that the projections tend to over-estimate future stock sizes and under-estimate future fishing mortality. Attempts to find a way to make the projections more accurate have so far have proven unsuccessful. These factors should be considered when reviewing impacts that use this tool.

7.1.1 Updates to Status Determination Criteria and Annual Catch Limits

7.1.1.1 Revised Status Determination Criteria

7.1.1.1.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action there would be no changes to status determination criteria (SDC) for groundfish stocks, or the resulting numerical estimates derived from these criteria. These values would be based on previous assessments. Since 2015 assessments were completed for all stocks, the use of values from the previous assessments would conflict with M-S Act requirements to use the best available science.

It is difficult to directly compare the Amendment 16 SDCs and subsequent revisions with updated biomass target values and the maximum fishing mortality thresholds to determine the impacts if the older values are retained because of differences between assessments. The 2015 peer review concluded that the GB cod and Atlantic halibut models were not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based on an alternative approach. In the case of GB cod, the update to the ASAP model was rejected, not the underlying benchmark formulation from SAW 55. Because a stock assessment model framework is lacking for Atlantic halibut, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is therefore not possible. The panel recommended that for GB cod that the SAW 55 assessment is the best scientific information for determining overfishing definitions. The panel concluded for Atlantic halibut that, based on the long-term exploitation history and survey trends, the stock is still overfished. Based on this information, the No Action SDC definitions for GB cod and Atlantic halibut are retained in Option 2.. Under Option 2, overfishing status is considered unknown for GB cod and halibut and the peer review concluded for both stocks that evidence suggests that these stocks should still be considered overfished. Option 1/No Action would not be expected to have direct or indirect impacts on groundfish species. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished.

Impacts on other species

Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic 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.

7.1.1.1.2 Option 2: Revised Status Determination Criteria (*Preferred Alternative*)

Impacts on regulated groundfish

Option 2 would reflect the most recent 2015 operational assessments and would be based on the best available science, consistent with the M-S Act. It is difficult to directly compare the Amendment 16 SDCs and subsequent revisions with updated biomass target values and the maximum fishing mortality threshold to determine the impacts if the older values are retained because of differences between assessments. Table 64 compares the stock status changes between the previous and current assessments.

The 2015 peer review concluded that the GB cod and Atlantic halibut models were not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based on an alternative approach. In the case of GB cod, the update to the ASAP model was rejected, not the underlying benchmark formulation from SAW 55. Because a stock assessment model framework is lacking for Atlantic halibut, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is therefore not possible. The panel recommended that for GB cod that the SAW 55 assessment is the best scientific information for determining overfishing definitions. The panel concluded for Atlantic halibut that, based on the long-term exploitation history and survey trends, the stock is still overfished. Based on this information, the No Action SDC definitions for GB cod and Atlantic halibut are retained in Option 2. Under Option 2, overfishing status is considered unknown for GB cod and halibut and the peer review concluded for both stocks that evidence suggests that these stocks should still be considered overfished. Option 2 would not be expected to have direct or indirect impacts on groundfish species. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished.

Impacts on other species

Option 2 would not be expected to have direct or indirect 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.

Table 64 - Comparison of stock status changes between the previous and current assessments.

	Previous Assessment		Current Assessment	
Stock	Overfishing?	Overfished?	Overfishing?	Overfished?
Georges Bank Cod	Yes	Yes	Unknown	Yes
Gulf of Maine Cod	Yes	Yes	Yes	Yes
Georges Bank Haddock	No	No	No	No
Gulf of Maine Haddock	No	No	No	No
Georges Bank Yellowtail Flounder	Unknown	Unknown	Unknown	Unknown
Southern New England/Mid-Atlantic Yellowtail Flounder	No	No	Yes	Yes
Cape Cod/Gulf of Maine Yellowtail Flounder	Yes	Yes	Yes	Yes
American Plaice	No	No	No	No
Witch Flounder	Yes	Yes	Yes	Yes
Georges Bank Winter Flounder	No	No	Yes	Yes
Gulf of Maine Winter Flounder	No	Unknown	No	Unknown
Southern New England/Mid-Atlantic Winter Flounder	No	Yes	No	Yes
Acadian Redfish	No	No	No	No
White Hake	No	No	No	No
Pollock	No	No	No	No
Northern Windowpane Flounder	Yes	Yes	No	Yes
Southern Windowpane Flounder	No	No	No	No
Ocean Pout	No	Yes	No	Yes
Atlantic Halibut	No	Yes	Unknown	Yes
Atlantic Wolffish	No	Yes	No	Yes

7.1.1.2 Annual Catch Limits

7.1.1.2.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action, the ACLs specified for FY 2016 would be unchanged from those adopted through FW 53 (Table 7). Default specifications, set at 35% of the FY2015 catch limits, would be put in place for all other stocks and expire on July 31st, 2016 or when replaced by new specifications (Table 6). This analysis, and the results of QCM B (see Table 109), are based on the assumption that default specifications would not be replaced before the end of the fishing year. Default specifications were adopted through FW53 with the intent of allowing the fishing year to begin on time in the event of a delay in rulemaking. Further, the mid-water trawl fishery sub-ACL for GB haddock would fall under the default specifications. If Option 1 is selected there would be no quotas specified for transboundary stocks (GB yellowtail flounder, cod, and haddock) including no scallop or small-mesh fisheries sub-ACL for GB yellowtail flounder. In addition, no scallop fishery sub-ACL for SNE/MA yellowtail flounder or southern windowpane flounder would be specified. The distribution of Annual Catch Limits (ACLs) to other fishery sub-components would be maintained.

Under Option 1/No Action, the directed groundfish fishery would be expected to operate in all broad stock areas through July 31st. As of August 1st, the following allocated stocks would not have ACLs specified: GB cod, GB haddock, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, American plaice, witch flounder, SNE/MA winter flounder, and redfish. Pollock, redfish, American plaice, and witch flounder are unit stocks – meaning that their stock area includes the GOM, GB, and SNE/MA. In the absence of stock specific specifications, commercial groundfish vessels would be unable to fish in the respective broad stock areas without an allocation. In addition, mid-water trawl vessels would not have a sub-ACL in place for GB haddock after July 31st, and would not be permitted to fish in the GB haddock stock area.

It is anticipated that Option 1/No Action would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31st, Option 1 would be expected to reduce commercial groundfish fishing effort in the GOM, GB, and SNE/MA.

After July 31, an Overfishing Level (OFL), Acceptable Biological Catch (ABC) or ACLs would not be defined for certain stocks in the multispecies fishery. Without specification of an ACL, a catch would not be allocated to the groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for these stocks. Catches would not be eliminated because there would probably be incidental catches or bycatch from other fisheries. The lack of an OFL makes it difficult to determine whether overfishing is likely to occur, however, with limited fishing activity the probability of overfishing would be low. Accountability Measures (AMs) in the multispecies fishery would be maintained but are expected to have a low probability of being triggered without allocations.

In addition to the lack of targeted groundfish fishing activity on stocks without an ACL, certain provisions of the sector management system make it likely that fishing activity could be constrained even for stocks with an ACL. Current management measures require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on stocks for which the sector continues to have ACE only if the sector can demonstrate it would not catch the ACE-limited stock. What these provisions mean is that in most cases there would be little opportunity for sector vessels to fish on stocks that have an ACL under no action, most groundfish fishing activity would not occur. As a result, in general Option 1 would be expected to result in dramatically lower fishing mortality and dramatically lower impacts to regulated groundfish species as compared to the alternative specifications (Option 2). The default specifications would continue to allow fishing for the first three months of the fishing year, but after that effort and biological impacts on regulated groundfish species would decline. As a result, in general Option 1 would be expected to result in dramatically lower fishing mortality and more rapid stock rebuilding than would be the case for Option 2.

An age based assessment was used to assess the following stocks:

- GOM cod
- GB haddock
- GOM haddock
- SNE/MA yellowtail flounder
- CC/GOM yellowtail flounder
- American plaice
- Witch flounder
- GB winter flounder
- SNE/MA winter flounder
- Redfish
- White hake
- Pollock

These models project the estimated median stock sizes expected to result by limiting catches to the ABC. In general, recent experience suggests that the projections tend to be biased high, predicting stocks sizes that are larger than realized and fishing mortality rates that are higher than expected (Groundfish Plan Development Team, pers. comm.).

There may be catches of these stocks by the groundfish fishery under default specifications through July 31, 2016 and by other fisheries throughout the year under Option 1/No Action. An estimate of these catches to approximate the catches that might occur was compared to ABCs under Option 2 (Table 65). Using this information, a qualitative comparison of impacts on SSB by stock under Option 1/No Action and Option 2 is provided. In this section, SSB is used as a proxy for impact designation. Generally, lower fishing mortality under Option 1 /No Action leads to increases in SSB, relative to Option 2 and is considered a positive impact on stocks that are not rebuilding sufficiently. For stocks that have a rebuilt status, Option 1/No Action may reduce fishing effort to levels substantially less than the MSY, however this is considered to be a negligible impact on the stock depending on the uncertainties in the stock projections.

Table 65 - Estimated catches that might occur in FY 2016 under Option 1/No Action. The "No Action Assumed Catch" used to compare to 2016 ABC used in Option 2 stock projections.

	2016			
Stock	**Groundfish Fishery Assumed Catch**	**Other Assumed Catch**	**Total Assumed Catch**	**ABC**
GOM cod	*(16+66)* **82**	*(27+10)* **37**	119	500
GB haddock	**327**	*(561+561+79+21,830)* **23,031**	23,358	77,898
GOM haddock	*(21+405)* **426**	(26+26+34) **86**	512	3,630
SNE/MA yellowtail flounder	**19**	(5+29+38) **72**	91	267
CC/GOM yellowtail flounder	**7**	*(43+26)* **69**	76	427
American plaice	**38**	*(26+26)* **52**	90	1,297
Witch flounder	**14**	*(12+59)* **71**	85	460
GB winter flounder	**71**	*(60+87)* **147**	218	755
SNE/MA winter flounder	**33**	*(70+94)* **164**	197	780
Redfish	**275**	*(103+207)* **310**	585	10,338
White hake	**110**	*(38+75+62)* **175**	285	3,816
Pollock	**258**	(1,279+1,279) **2,558**	2,816	21,312

Notes:

Groundfish Fishery Assumed Catch:

- *Commercial - Results from the quota change model – no action ACLs with ASM of 37% – were used (see Table 109 in Economic Impacts).*
- *Recreational – Results from the bioeconomic model – status quo – no change to recreational measures – were used (see Table 121 in Economic Impacts)*

Other Assumed Catch:

- *Includes the state waters and other sub-components for FY 2016 Table 10 (Option 2 in Alternatives under Consideration).*
- *Includes the Scallop PDT's estimate of catches of SNE/MA yellowtail flounder (38) for FY 2016 under Scallop FW 27 preferred alternative (Table 12).*
- *However for stocks that would have default specifications under the No Action/Option 1 for FY 2016 and sub-ACLs for non-groundfish catches, the default specifications (i.e., the GB haddock sub-ACL in the mid-water trawl fishery for Atlantic herring) were used to approximate catches based on Table 7 (Option 1 in Alternatives under Consideration).*
- *Canadian quota for FY 2016 (21,830) was added to GB haddock following Table 10 (Option 2 in Alternatives under Consideration), and estimated Canadian catches were added for GB winter flounder (87) and white hake (62) based on Appendix II.*

Gulf of Maine Cod- Under Option 1/No Action the assumed catch in FY 2016 is 119 mt versus 500 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Georges Bank Haddock- Under Option 1/No Action the assumed catch in FY 2016 is 23,358 mt versus 77,898 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Gulf of Maine Haddock- Under Option 1/No Action the assumed catch in FY 2016 is 512 mt versus 3,630 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Southern New England/Mid-Atlantic Yellowtail Flounder- Under Option 1/No Action the assumed catch in FY 2016 is 91 mt and 267 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Cape Cod/Gulf of Maine Yellowtail Flounder- Under Option 1/No Action the assumed catch in FY 2016 is 76 mt versus 427 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

American Plaice- Under Option 1/No Action the assumed catch in FY 2016 is 90 mt versus 1,297 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Witch Flounder- Under Option 1/No Action the assumed catch in FY 2016 is 85 mt versus 460 mt (or the range considered 399 mt to 521 mt) under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Georges Bank Winter Flounder- Under Option 1/No Action the assumed catch in FY 2016 is 218 mt versus 755 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Southern New England/Mid-Atlantic Winter Flounder- Under Option 1/No Action the assumed catch in FY 2016 is 197 mt versus 780 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Redfish - Under Option 1/No Action the assumed catch in FY 2016 is 585 mt versus 10,338 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

White Hake- Under Option 1/No Action the assumed catch in FY 2016 is 285 mt versus 3,816 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Pollock- Under Option 1/No Action the assumed catch in FY 2016 is 2,816 mt versus 21,312 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Is not possible to project stock sizes for the following stocks:

- GB Cod
- GB Yellowtail Flounder
- GOM Winter Flounder
- Northern Windowpane Flounder

- Southern Windowpane Flounder
- Ocean Pout
- Atlantic halibut
- Atlantic Wolffish

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on an exploitation rate (i.e., GB yellowtail flounder) or the SSC's default control rule of 75% F_{MSY} (i.e., GOM winter flounder) or an alternative approach (i.e., GB cod and Atlantic halibut) or 75% of F_{MSY} (remaining stocks on the above list) applied to the most recent estimate of stock size. As a result, if stock size does not decline then the proposed ABC would not be expected to result in overfishing. This is an unrealistic assumption – stock size could increase or decrease but is unlikely to remain constant.

Impacts on other species

Option 1/No Action is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. Indirect effects are generally likely to be beneficial given the expected reduced 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. Considering the differences between the ACLs of Option 1/No Action and Option 2, the fishing mortality on other stocks would probably be lower under Option 1/No Action.

Lastly, sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl (MWT) herring fisheries, and exceeding the allocations results in triggering AMs in-season. The default GOM and GB haddock specifications for the MWT herring fishery represent a reduction in the sub-ACL when compared to Option 2. By reducing the catch limit at which in-season AMs are triggered, No Action may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock.

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

- *Option 2 – Preferred Alternative, including:*
    - *Sub-Option 1A – SNE/MA Yellowtail Flounder Scallop sub-ACL at 90% of Estimated Scallop Fishery Catch (Preferred Sub-Option)*
    - *Sub-Option 2B –Witch Flounder ABC of 460 mt (Preferred Sub-Option)*

Impacts on regulated groundfish

Option 2 would adopt new ABCs consistent with the best available science for all stocks. Generally, increases in SSB are lower under Option 2 than those under Option 1/No Action.

Because this option would adopt FY 2016 – FY 2018 ABCs for all stocks, and all the stocks have recent assessment updates, short-term projections can be used to estimate the probability of overfishing and short-term changes in stock size for those stocks listed in Table 65. These projections use catches equal to the ABCs that would be adopted if 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. However, experience demonstrates that projections tend to be overly optimistic, and therefore, concerns about over-estimating the risk of overfishing and under-estimating future stock size are expected to be minimal.

Projected stock sizes are provided in Table 66 to Table 81 for these stocks and the probability of overfishing is listed in Table 82. This table compares projected future stock size to both 2017 and 2018. A comparison of probability of overfishing between the two options is difficult as Option 1/No Action has no OFLs defined for some stocks.

Relative to FY 2015, Option 2 would increase FY 2016 ACLs for GB and GOM haddock, GOM cod, GOM winter flounder, pollock, halibut, wolffish, and southern windowpane flounder. There would be several decreases in FY 2016 ACLs, specifically witch flounder, SNE/MA yellowtail flounder, GB winter flounder, and GB cod. Under Option 2, the declining ACLs for several stocks are likely to constrain the directed fishery, and may reduce fishing effort in all broad stock areas relative to fishing effort in FY 2015.

Gulf of Maine Cod- The recent assessment for GOM cod indicates that the stock is well below SSB_{MSY} (4%-6% of target SSB_{MSY} in 2014). Under Option 2, the projections indicate an increase in SSB after 2016. For Option 2, three scenarios were run dependent on the natural mortality assumption, base (m=0.2) and ramp (m=0.2 and m= 0.4); each show an increase in SSB after 2016 but it remains well below SSB_{MSY} (Table 66, Table 67, Table 68). Under Option 1/No Action the assumed catch in FY 2016 is 119 mt versus 500 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 66 - Projection results from the M=0.2 model for Gulf of Maine cod, SSB_{MSY} = 40,187mt, F_{MSY}=0.185.

Year	OFL	ABC	F	SSB
2016	667	500	0.130	4,445
2017	667	500	0.092	6,153
2018	667	500	0.067	8,418

Table 67 – Projection results from the M-ramp model, M=0.2 for Gulf of Maine cod, SSB_{MSY} = 59,045 mt, F_{MSY}=0.187.

Year	OFL	ABC	F	SSB
2016	667	500	0.122	5,002
2017	667	500	0.080	7,413
2018	667	500	0.054	10,688

Table 68 - Projection results from the M-ramp model, M=0.4 for Gulf of Maine cod, SSB_{MSY} = 59,045 mt, F_{MSY}=0.187.

Year	OFL	ABC	F	SSB
2016	667	500	0.167	3,853
2017	667	500	0.137	4,615
2018	667	500	0.115	5,447

Georges Bank Haddock- The recent assessment for GB haddock indicates that the stock is well above SSB_{MSY} (139% of target SSB_{MSY} in 2014). The stock is expected to increase from 2016 to 2017 and then decrease from 2017 to 2018 under Option 2 (Table 69). Under Option 1/No Action the assumed catch in FY 2016 is 23,358 mt versus 77,898 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 69 - Projection results from the Georges Bank haddock, SSB_{MSY} = 108,300 mt, F_{MSY}=0.39.

Year	OFL	ABC	F	SSB
2016	160,385	77,898	0.181	1,190,563
2017	258,691	77,898	0.109	1,350,021
2018	358,077	77,898	0.075	1,253,343

Gulf of Maine Haddock- The recent assessment for GOM haddock indicates that the stock is well above SSB_{MSY} (223% of target SSB_{MSY} in 2014). The stock is expected to increase slightly from 2016 to 2017 and then decrease from 2017 to 2018 under Option 2. Under Option 1/No Action the assumed catch in FY 2016 is 512 mt versus 3,630 mt under Option 2 (Table 70). Therefore, SSB increases are expected to be greater under Option 1 than Option 2 (Table 65).

Table 70 - Projection results for Gulf of Maine haddock, SSB_{MSY} = 4,623 mt, F_{MSY}=0.468.

Year	OFL	ABC	F	SSB
2016	4,717	3,630	0.351	25,635
2017	5,873	4,534	0.351	25,915
2018	6,218	4,815	0.351	22,532

Southern New England/Mid-Atlantic Yellowtail Flounder- The recent assessment for SNE/MA yellowtail flounder indicates that the stock is below SSB_{MSY} (26% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 71). Under Option 1/No Action the assumed catch in FY 2016 is 91 mt and 267 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 71 - Projection results for Southern New England/Mid-Atlantic yellowtail flounder, SSB_{MSY} = 1,959 mt, F_{MSY} = 0.35.

Year	OFL	ABC	F	SSB
2016	Unknown	267	0.747	460
2017	Unknown	267	0.750	531
2018	Unknown	267	0.510	888

The peer review of the 2015 Groundfish Operational Assessments concluded that SNE/MA yellowtail flounder is no longer rebuilt and that the stock is overfished and overfishing is occurring. This is a dramatic change from the previous assessment in 2012 (SAW 54), which concluded that the stock is rebuilt, is not overfished, and overfishing is not occurring. Upon its review, the SSC determined that the results of the SNE/MA yellowtail flounder model were too uncertain to use when determining the numerical estimates of the OFL and ABC for catch advice in FY 2016 – FY 2018. In light of this, the SSC recommended that the OFL be considered unknown. There was general agreement among the SSC that the stock is showing troubling signs. In addition to the low biomass estimated by the assessment model, survey trends are generally declining over multiple time horizons. Therefore, the SSC agreed that a substantial reduction in catch is needed for this stock. To achieve this reduction, the SSC recommended that ABC not exceed the average of the estimated CY 2015 catch (422mt) and the 2016 ABC recommendation that would result from the biomass projection from the assessment outcomes (111mt). The result is an ABC recommendation for FY 2016- FY 20018 of 267 mt, a substantial reduction from the FY 2015 of 700 mt. Assuming that stock size will increase in the near term, the constant catch approach allows SSB to increase annually by decreasing F by the end of the three-year period.

Cape Cod/Gulf of Maine Yellowtail Flounder- The recent assessment for CC/GOM yellowtail flounder indicates that the stock is below SSB_{MSY} (16% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 72). Under Option 1/No Action the assumed catch in FY 2016 is 76 mt and 427 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 72 - Projection results for Cape Cod/Gulf of Maine yellowtail flounder, SSB_{MSY} = 5,259 mt, F_{MSY} = 0.279.

Year	OFL	ABC	F	SSB
2016	555	427	0.21	2,485
2017	707	427	0.161	3,074
2018	900	427	0.125	4,053

American Plaice- The recent assessment for American plaice indicates that the stock is below but approaching SSB_{MSY} (84% of target SSB_{MSY} in 2014). The stock is expected to decrease slightly from 2016 to 2017 and then increase from 2017 to 2018 under Option 2 (Table 73). Under Option 1/No Action the assumed catch in FY 2016 is 90 mt versus 1,297 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 73 - Projection results for American plaice, SSB_{MSY} = 13,107 mt, F_{MSY}=0.196.

year	OFL	ABC	F	SSB
2016	1,695	1,297	0.147	8,743
2017	1,748	1,336	0.147	8,740
2018	1,840	1,404	0.147	9,417

Witch Flounder- The recent assessment for witch flounder indicates that the stock is below SSB_{MSY} (22% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 74, Table 75, Table 76). Under Option 1/No Action the assumed catch in FY 2016 is 85 mt versus 460 mt (or the range considered 399 mt to 521 mt) under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

The Council considered a range of ABCs for witch flounder from 399 mt (75% F_{MSY} in FY 2016) to 521 mt (F_{MSY} in FY 2016). The SSC's recommended upper limit was 500 mt and Appendix I details the SSC's recommendations for witch flounder. The stock is currently in a 7 year rebuilding plan, and projections indicate that the stock cannot rebuild by 2017 with F=0. In such instances, National Standard 1 guidelines suggest setting the ABC at $75\%_{FMSY.}$ The Council's preferred alternative is 460 mt for FY 2016 – FY 2018. In practice, as noted above, a $F_{rebuild}$ approach for witch flounder would be similar to the impacts of No Action.

Additional biological analysis of witch flounder is included in the following section.

Table 74 - Projection results for witch flounder, holding the lowest value of 75% FMSY for FY 2016- FY 2018 projected catches constant for three years (i.e., 75% FMSY constant 2016), SSB_{MSY} = 9,473 mt, F_{MSY}=0.279.

year	OFL	ABC	F	SSB
2016	521	399	0.209	3,253
2017	745	399	0.142	4,342
2018	982	399	0.107	5,688

Table 75 - Projection results for witch flounder, holding the middle value for 75% FMSY and FMSY for 2016 projected catches constant for three years (i.e., 460 mt), SSB_{MSY} = 9,473 mt, F_{MSY}=0.279.

year	OFL	ABC	F	SSB
2016	521	460	0.244	3,244
2017	732	460	0.169	4,276
2018	954	460	0.128	5,562

Table 76 - Projection results for witch flounder, holding the 2016 FMSY value constant for three years (i.e., 75%FMSY for 2016), SSB_{MSY} = 9,473 mt, F_{MSY}=0.279.

year	OFL	ABC	F	SSB
2016	521	521	0.279	3,234
2017	719	521	0.197	4,210
2018	927	521	0.150	5,437

Georges Bank Winter Flounder- The recent assessment for GB winter flounder indicates that the stock is below SSB_{MSY} (43% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 77). Under Option 1/No Action the assumed catch in FY 2016 is 218 mt versus 755 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 77 - Projection results for Georges Bank winter flounder, SSB_{MSY} = 6,700 mt, F_{MSY}=0.536.

year	OFL	ABC	F	SSB
2016	957	755	0.402	2,293
2017	1,056	755	0.36	2,617
2018	1,459	755	0.252	3,786

Southern New England/Mid-Atlantic Winter Flounder- The recent assessment for SNE/MA winter flounder indicates that the stock is below SSB_{MSY} (23% of target SSB_{MSY} in 2014). The stock is expected to decrease from 2016 to 2017 and then increase from 2017 to 2018 under Option 2 (Table 78). Under Option 1/No Action the assumed catch in FY 2016 is 197 mt versus 780 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 78 - Projection results for Southern New England/Mid-Atlantic winter flounder, SSB_{MSY} = 26,928 mt, F_{MSY}=0.325.

year	OFL	ABC	F	SSB
2016	1,041	780	0.237	4,786
2017	1,021	780	0.243	4,041
2018	1,587	780	0.152	5,065

Acadian Redfish- The recent assessment for Acadian redfish indicates that the stock is well above SSB_{MSY} (117% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 79). Under Option 1/No Action the assumed catch in FY 2016 is 585 mt versus 10,338 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 79- Projection results for Acadian redfish, SSB_{MSY} = 281,112 mt, F_{MSY}=0.038.

year	OFL	ABC	F	SSB
2016	13,723	10,338	0.028	368,571
2017	14,665	11,050	0.028	387,014
2018	15,260	11,501	0.028	401,143

White Hake- The recent assessment for white hake indicates that the stock is below but approaching SSB_{MSY} (88% of target SSB_{MSY} in 2014). The stock is expected to decrease during the projected years under Option 2 (Table 80). Under Option 1/No Action the assumed catch in FY 2016 is 285 mt versus 3,816 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 80- Projection results for white hake, SSB_{MSY} = 32,550, F_{MSY}=0.188.

year	OFL	ABC	F	SSB
2016	4,985	3,816	0.141	29,619
2017	4,816	3,686	0.141	28,711
2018	4,733	3,622	0.141	28,355

Pollock- The recent assessment for pollock indicates that the stock is well above SSB_{MSY} (147% of target SSB_{MSY} in 2014). The stock is expected to increase during the projected years under Option 2 (Table 81). Under Option 1/No Action the assumed catch in FY 2016 is 2,816 mt versus 21,312 mt under Option 2 (Table 65). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Table 81- Projection results for pollock, SSB_{MSY} = 105, 226 mt, F_{MSY}=0.277.

year	OFL	ABC	F	SSB
2016	27,668	21,312	0.307	178,534
2017	32,004	21,312	0.261	181,807
2018	34,745	21,312	0.238	184,116

Table 82 - Estimated probability of overfishing if catch is equal to ABC. Note these results are from the projection output alone. Uncertainty comes from the model and projections, therefore these probabilities do not account for the true uncertainty and therefore should not be considered as absolutes. These estimates are likely an underestimate of the true uncertainty based on past experience with model and projection results.

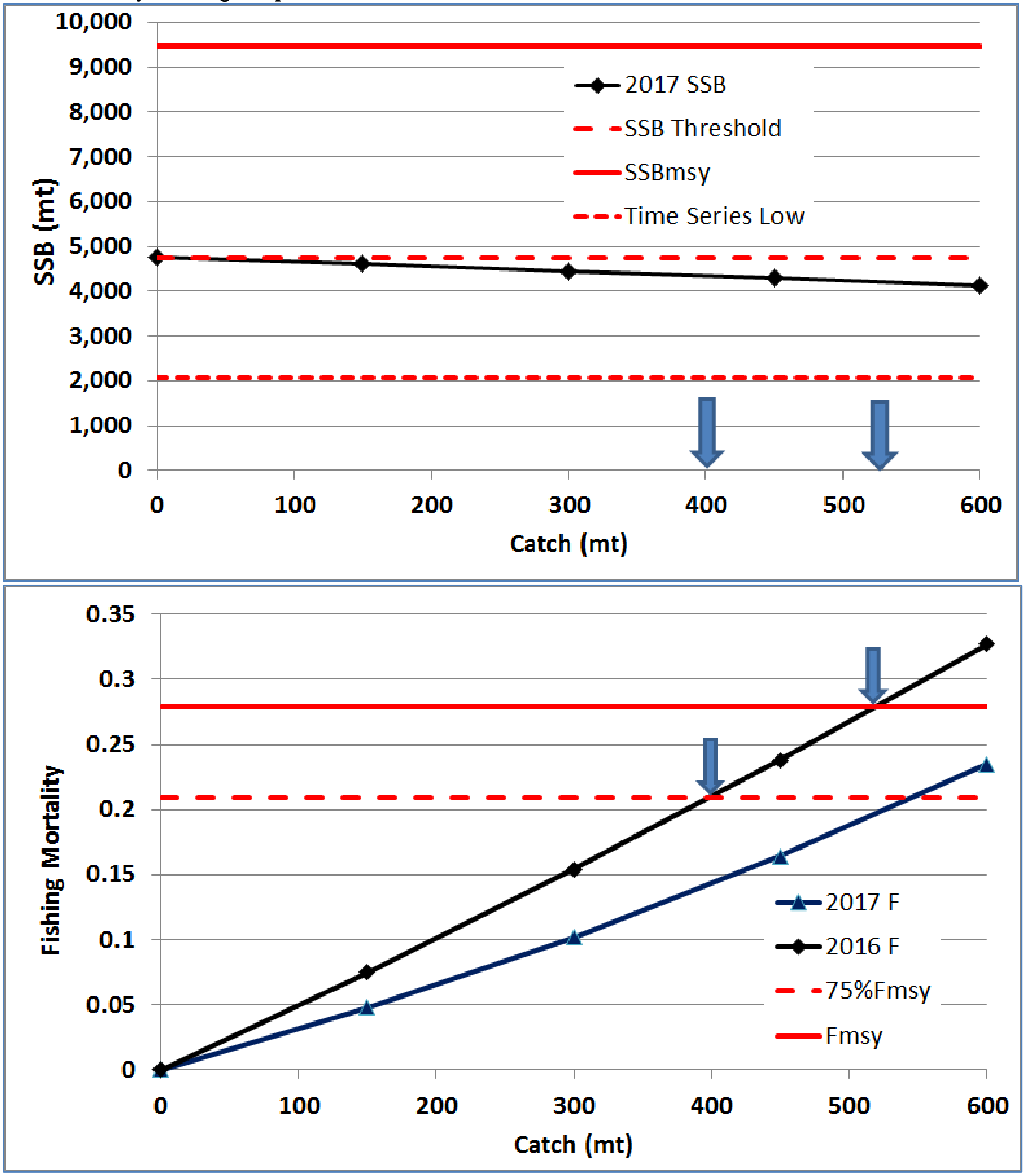
		Probability of Overfishing		
Species	Stock	2016	2017	2018
Cod	GB	NA	NA	NA
Cod (m=0.2 model)	GOM	0.056	0	0
Cod (mramp m=0.2)	GOM	0.025	0	0
Cod (mramp m=0.4)	GOM	0.331	0.102	0.029
Haddock	GB	0.008	0.002	0.001
Haddock	GOM	0.146	0.18	0.221
Yellowtail Flounder	GB	NA	NA	NA
Yellowtail Flounder	SNE/MA	NA	NA	NA
Yellowtail Flounder	CC/GOM	0.054	0.002	0
Plaice		0.002	0.009	0.03
Witch Flounder (460 mt)		0.219	0.011	0
Winter Flounder	GB	0.188	0.112	0.023
Winter Flounder	GOM	NA	NA	NA
Winter Flounder	SNE/MA	0.009	0.06	0.006
Redfish		0	0	0
White Hake		0.003	0.006	0.005
Pollock		0.057	0.019	0.009
Windowpane Flounder	GOM/GB	NA	NA	NA
Windowpane Flounder	SNE/MA	NA	NA	NA
Ocean Pout		NA	NA	NA
Atlantic Halibut		NA	NA	NA
Atlantic Wolffish		NA	NA	NA

Additional analysis for witch flounder specifications

Comparison Projections

For the purpose of examining the relative biological risk, projections were run at a range of 2016 quotas of 0, 150 mt, 300 mt, 450 mt, and 600 mt and plotted against the projected SSB in 2017. Likewise, projected F in 2016 and F in 2017 are compared. In general, projected increases in SSB decline with increases in quota and the risk of overfishing increases with increases in quota (Figure 16). An assumption of these conclusions is that the projections are correct, but past experience suggests that projections tend to be overly optimistic.

Figure 16- Projections to examine the relative biological risk of a range of 2016 quotas of 0, 150 mt, 300 mt, 450 mt, and 600 mt with projected SSB in 2017 (top) and projected F in 2016 and F in 2017 (bottom). Arrows identify the range of quotas under consideration.



Witch Flounder Kept Catch Ratios-

To examine how the fishery interacts with witch flounder, the PDT reviewed witch flounder kept catch ratios to total kept catch (Kall) at the haul and trip level by broad stock area (BSA) for observed sector trips using large mesh otter trawls. Trip level data is one way to examine targeting behavior. If the ratio of witch flounder kept to total kept is high, this would suggest that the trip was targeting witch flounder. Conversely, if the ratio of witch flounder kept to total kept catch is low (between 1%-10%), this would suggest other stocks were being targeted on that trip. Trip level kept catch ratios shown in Figure 17 are consistent with the presence/absence plots in **Figure 32** in all broad stock areas. Based on this trip level data, witch flounder tend to be caught on most trips and therefore more difficult for the groundfish fleet to avoid in BSA 1 to 3. Very similar results are seen in the Sustainable Harvest Sector data (Figure 18). This data also suggests that smaller vessels are more dependent on witch flounder landings relative to the larger vessels in the sector.

Figure 17 - Ratios of witch flounder kept to total kept catch by sector trip (large mesh otter trawl only) for CY2014, BSA 1 - GOM, BSA 2 - Inshore GB, BSA 3 - GB, BSA 4 - SNE/MA.

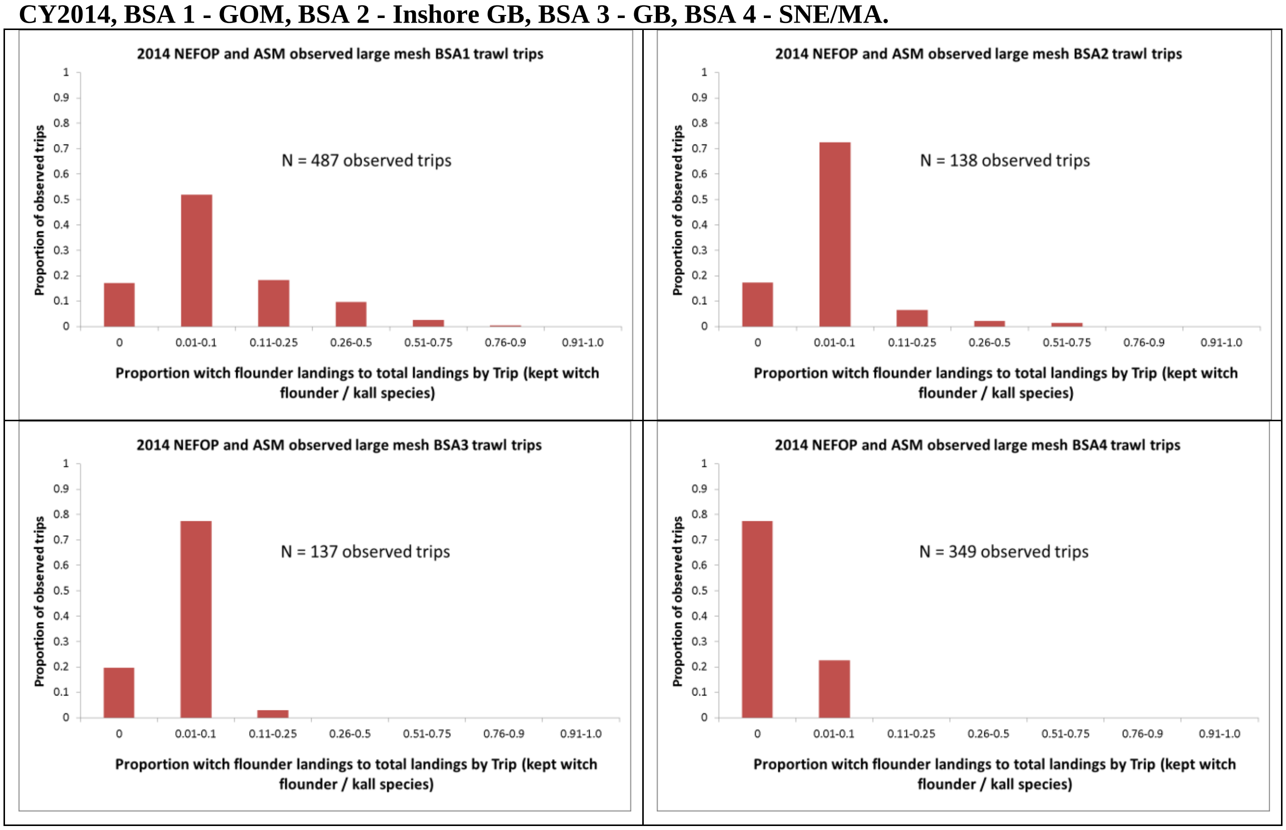
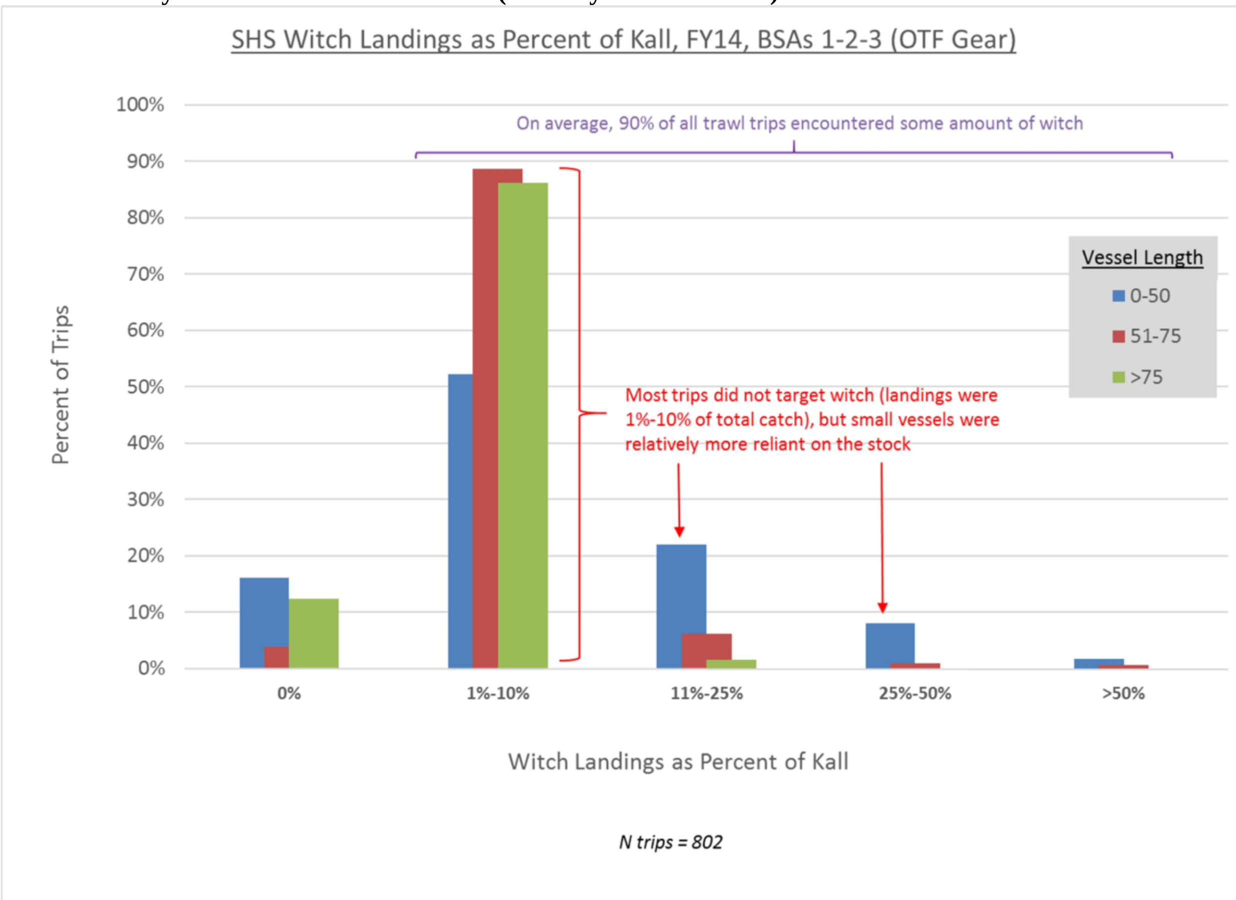


Figure 18 - Ratios of witch flounder kept to total kept catch by Sustainable Harvest Sector for large mesh otter trawls by vessel size class for FY2014 (courtesy of Hank Soule).



Witch Landings Per Trip in Pounds		
Length	**Median**	**Mean**
0-51	235	318
51-75	410	664
>75	341	524

The PDT also examined haul level data for witch flounder kept to total kept catch since targeting behavior occurs on the haul level and not necessary on a trip level (Figure 19). Haul level data also shows that most hauls caught witch flounder and witch flounder was a relatively small proportion of the haul's landings in BSA 1. While the bar charts in Figure 19 are not perfectly analogous to the presence/absence plots in **Figure 32** (see Economic Impacts), they are correlated in that kept catch is consistent across the datasets. The majority of hauls in the GOM (>60%) caught legal sized witch flounder during calendar year 2014. The BSA with the second highest ratio of hauls with kept catch was BSA 2, or the inshore GB (SA 521). The proportion of positive hauls with kept catch is around 30% in BSA 3, which is not unexpected given the spatial distribution of positive/negative hauls in **Figure 32**.

The PDT also examined the haul level kept catch ratios temporally by BSA (). The lattice boxplot is a way to look at how individual hauls in each BSA are distributed across the calendar year. Figure 19 is especially helpful in determining how many hauls did not have a kept catch of witch flounder. As over 50% of hauls in three of the four BSAs did not have kept catch, many on boxplots in are collapsed around zero. Tows with a large proportion of witch flounder kept catch are mostly shown as outliers in the plots. During July and August in the GOM (BSA 1), witch flounder appears to become more available to the fishery. Overall, it appears that witch flounder are available to the fishery year round in the GOM.

Ostensibly, quotas and accountability measures will ensure that catch does not exceed allowable and acceptable catch limits. In practice, in-season catch monitoring for allocated groundfish stocks has indicated that sectors have stayed within catch limits since 2010. However, the life history and spatial/temporal abundance of a species may overlap with the fishery in such a way that there may be concern around the ability of in-season catch accounting and AMs to keep catches under prescribed catch limits. For example, if aggregations of an animal prove unavoidable for the fishery, there may be an increased biological risk to the stock. Both the trip and haul level data suggest that while the fishery overlaps with the distribution of witch flounder in time and space, the life history of this animal does not predispose it to large catches in a short time period which could not be accounted for by in-season catch accounting. This is consistent with quota change model (QCM) results found in Section 7.4, particularly Table 101, Table 102, and Table 111, which indicate that witch flounder utilization will be less than the catch limit.

In summary, projections for results of the three witch flounder ABCs indicate that with increasing quota there is increased risk of overfishing, less projected stock growth, and increased projected fishing mortality. However, short term risk for the preferred alternative (ABC=460 mt) is dampened by a constant catch approach (Table 75) for FY 2017 (F=.169) and FY 2018 (F=.128). As shown in Table 101, the QMC predicts that sector catches of witch flounder will be 51mt less (310 mt, 86% utilization) than the sector sub-ACL of 361 mt (ABC = 460 mt) because overall sector catch and effort will be constrained by low GB and GOM cod quotas. Based on the constraining nature of the cod stocks in the QCM, the estimated sector catch of witch flounder is less than the commercial groundfish ACL when the ABC is set at 399mt or 75%F_{MSY} (commercial groundfish ACL=312 mt, Table 10). Thus, for , although the witch flounder projections suggest increased biological risk with increased quotas, this risk is not expected because available analysis suggests that quotas for other species will constrain witch flounder catch to the level associated with the lowest ABC under consideration (399 mt).

Figure 19 - Ratios of witch flounder kept to total kept catch by sector hauls (large mesh otter trawl only) for CY2014, BSA 1 - GOM, BSA 2 - Inshore GB, BSA 3 - GB, BSA 4 - SNE/MA.

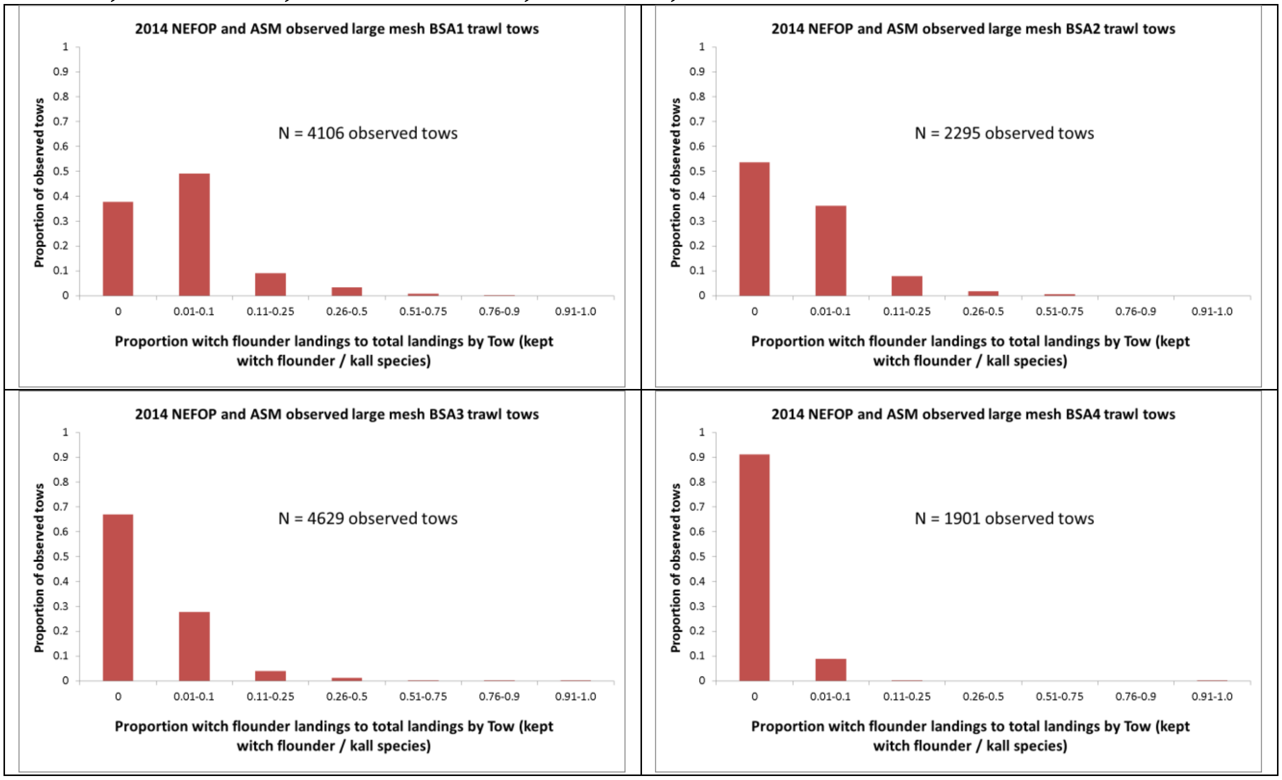
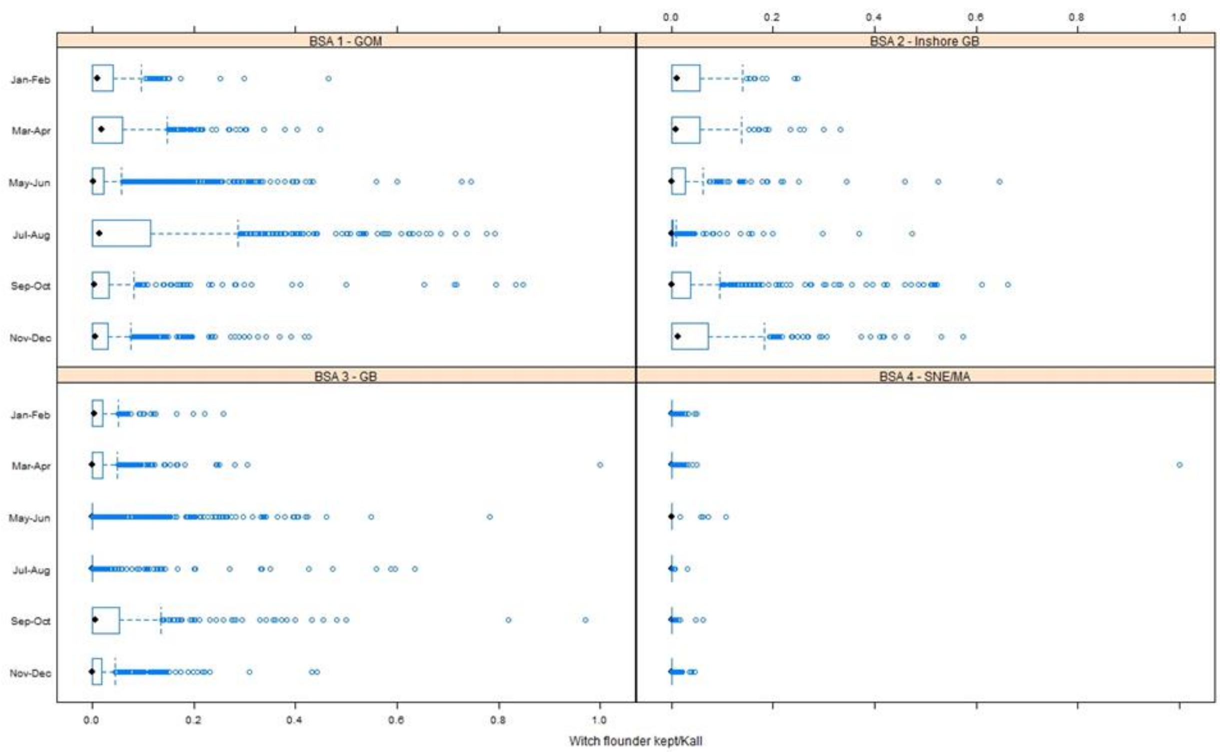


Figure 20 - Lattice boxplot of witch flounder kept/Kall by BSA and bi-monthly intervals, CY 2014.



Overview of Scallop FW 27 and Projected Catches of Groundfish Stock for FY 2016 – FY 2018

The final Council preferred alternative for scallop fishery specification in FY 2016 results in a total projected scallop catch of about 47 million pounds, including a maximum of about 4.47 million pounds for LAGC IFQ vessels. The remaining catch is for the limited access fishery as well as various set-asides for incidental permits, the research set-aside (RSA) program and the observer set-aside program. The limited access fishery specifications include 34.55 open area days-at-sea (DAS) for full-time limited access vessels and 13.82 for part-time vessels. Full-time limited access vessels will be allocated 51,000 pounds in access area catch and part-time vessels will be allocated 20,400 pounds. The proposed action includes a "flexible allocation" for Mid-Atlantic access areas. This means that each vessel can fish allocated catch in any of the Mid-Atlantic access areas, except for the inshore portion of the Elephant Trunk that will remain closed to protect small scallops in that area. The preferred alternative also includes a new closure south of Closed Area II currently in open areas to protect small scallops that have been observed in that area. Under the preferred alternative, all three access areas on Georges Bank will remain closed to the LA scallop fishery: Closed Area II, Closed Area I, and Nantucket Lightship.

For limited access general category (LAGC) vessels the total allocation is set at 5.5% of the total ACL available to the fishery in FY2016, or about 4.47 million pounds. Individual vessels will be allocated a specific poundage or quota based on their individual contribution factor plus or minus any quota they have permanently or temporarily leased. The preferred alternative includes an allocation of about 2,500 LAGC trips in access areas. This allocation is equivalent to the same proportion of access LA vessels have in access areas compared to open areas (34% of total projected catch for 2016 is projected to come from access areas). Applying that proportion to the total LAGC allocation of 4.47 million pounds comes out to about 1.5 million pounds, or 2,553 trips at 600 pounds per trip. This action maintains the LAGC Northern Gulf of Maine (NGOM) hard TAC at 70,000 pounds and the target TAC for LAGC vessels with incidental catch permits at 50,000 pounds. An estimate of catch from state waters has been updated in this action as well; it is based on an updated three-year average from 2012-2014 to 622,312 pounds per year.

Table 83 provides the Scallop PDT's estimates of projected groundfish catches by the scallop fishery under the Council's preferred alternative in Scallop FW 27). GB yellowtail flounder and southern windowpane flounder are projected to be below the scallop fishery's sub-ACLs. SNE/MA yellowtail flounder is projected to be slightly above the sub-ACLs. The scallop fishery does not have sub-ACLs for CC/GOM yellowtail flounder or northern windowpane flounder and therefore their catches are included in the other sub-component. For both stocks, scallop fishery catches are anticipated to be below the values estimated for the other sub-components. Catches for these stocks will continue to be evaluated in the PDT's annual review of other fisheries catches of groundfish stocks. Of note, northern windowpane flounder catches by the scallop fishery continue to be of concern based on past experiences of exceeding the ABCs for this stock. Further, the scallop fishery has conservation gear modifications via regulation and real-time avoidance communication systems that should lead to reductions in the bycatch of groundfish species. Therefore, actual catches of groundfish species by the scallop fishery may be lower than projected catches. In addition, there is less certainty in 2017 and 2018 projected catches of groundfish by the scallop fishery because the measures in those years would involve a forthcoming Scallop FMP action.

Table 83- Scallop PDT's estimates of projected groundfish catches by the scallop fishery under the Council's preferred Alternative 3A in Scallop FW 27.

Year	GB YT	SNE/MA YT	CC YT	N. WP	S. WP
2016	15.1	38.0 - 38.6	7.8	88.1	179.2
2017	26.3	40.4	8.5	93.8	160.6
2018	26.2	43.9	8.0	89.6	156.7

Impacts on other species

In general, the specification of groundfish ABCs and ACLs by this option would not be expected to have direct or indirect impacts on most other species. Other species are caught on groundfish fishing trips and the ABCs/ACLs could indirectly affect species if they result in changes in groundfish fishing activity. When compared to Option 1/No Action, this option would be expected to result in more groundfish fishing effort and as a result catches of other species would be expected to be higher. This would be expected to result in higher fishing mortality rates for those species when compared to the No Action alternative. Species such as monkfish, skates, and spiny dogfish are among those most likely to be affected. All of these species are subject to management controls, and it is not likely that fishing mortality will exceed targets. Indeed, when compared to recent years, the reduction in some groundfish ABCs/ACLs as proposed in this action would be expected to result in reduced catches of other species.

The ABCs and ACLs under Option 2 include specification of sub-ACLs for other fisheries with catches of groundfish species including GB yellowtail flounder, SNE/MA yellowtail flounder, southern windowpane flounder, GOM haddock, and GB haddock.

Sub-ACLs are designed to limit the incidental catch of yellowtail flounder and windowpane flounder by the scallop fishery. Exceeding catch limits may trigger accountability measures for the scallop fishery. A comparison of the preferred specifications (Table 10) and the scallop PDT's estimates of catch by the scallop fishery (Table 83) indicates that scallop fishery catches of GB yellowtail flounder and southern (SNE/MAB) windowpane flounder are predicted to be less than the sub-ACL for the fishery. Scallop catch estimates of SNE/MA yellowtail are slightly higher than the preferred sub-ACL (~6mt each year). However, as AMs are triggered by an overage of the entire ACL and implemented after the fishing year is complete, and the scallop sub-ACL represents less than 15% of the overall ACL, it is difficult to predict if groundfish sub-ACLs will have a directional impact on sea scallop biomass or fishing mortality. The overall impact of Option 2 ABCs and ACLs are likely to be negligible with respect to the Atlantic sea scallop resource.

In addition, sub-ACLs are designed to limit the incidental catch of GB yellowtail flounder by small-mesh fisheries, and exceeding the allocations results in triggering AMs in subsequent years. The accountability measure requires vessels to fish an approved selective trawl gear that reduces the catch of flatfish in the GB yellowtail flounder stock area. As small-mesh species can be effectively prosecuted using modified trawl gear, it is difficult to predict if groundfish sub-ACLs may have an affect fishing mortality and stock size of small-mesh species (e.g., whiting and squid). The overall impact of Option 2 ABCs and ACLs are likely to be low positive to negligible with respect to the squid and whiting fisheries on Georges Bank.

Lastly, sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl herring fisheries, and exceeding the allocations results in triggering AMs in-season. The sub-ACLs may affect fishing mortality and stock size of Atlantic herring by restricting herring fishing in areas before quotas are reached. .

7.1.2 Fishery Program Administration

7.1.2.1 Implementation of an Additional Sector

7.1.2.1.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action the existing list of 24 sectors would be maintained as-is. Maintaining the current fleet organization in terms of the number of authorized sectors is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the ACL.

Impacts on other species
Option 1/No Action would maintain the current groundfish fleet organization in terms of the number of authorized sectors and would not be expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

7.1.2.1.2 Option 2: Implement a New Sector for FY 2016 (*Preferred Alternative*)

Impacts on regulated groundfish

Under Option 2, the Sustainable Harvest Sector II would be allowed to operate beginning May 1, 2016. Changes to the fleet's organization in terms of the number of authorized sectors is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the ACL.

Impacts on other species
Under Option 2, changes to the groundfish fishery organization in terms of the number of authorized sectors is not expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

7.1.2.2 Sector Approval Process

7.1.2.2.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action the Amendment 16 procedures for approving a sector would be maintained. The sector approval process is administrative and is not related to fishing effort, or the fishery's impact on regulated groundfish species, so there are no biological impacts positive or negative on regulated groundfish species associated with this alternative.

Impacts on other species

Under Option 1/No Action the Amendment 16 procedures for approving a sector would be maintained. The sector approval process is administrative and is not related to fishing effort, or the fishery's impact on other species, so there are no biological impacts positive or negative on non-groundfish species such as monkfish, dogfish, skates, and sea scallops associated with this alternative.

7.1.2.2.2 Option 2: Revised Process for Approving New Northeast Groundfish Sectors (*Preferred Alternative*)

Impacts on regulated groundfish

Under Option 2, the process would be revised to still allow for Council input to the process, but sector approvals would no longer be considered as part of a Council management action. This change adds flexibility to the sector approval process. As above, there are no biological impacts, positive or negative, on regulated groundfish species associated with changes to the procedure for sector approvals.

Impacts on other species

Under Option 2, the process would be revised to still allow for Council input to the process, but sector approvals would no longer be considered as part of a Council management action. This change adds flexibility to the sector approval process. As above, there are no biological impacts positive or negative on non-groundfish species such as monkfish, dogfish, skates, and sea scallops associated with this alternative.

7.1.2.3 Modification to the Definition of the Haddock Separator Trawl

7.1.2.3.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action the current regulatory definition of this gear would be maintained (see 50 CFR 648.85(a)(3)(iii)(A)). Use of the gear as defined would continue to provide positive benefits for regulated groundfish species, specifically reducing catches of cod and flatfish species, such as windowpane flounder and GB yellowtail flounder.

Impacts on other species

Under Option 1/No Action, use of the gear as defined would continue to provide positive benefits for other species, if they are excluded by the gear during operation.

7.1.2.3.2 Option 2: Revised Definition of the Haddock Separator Trawl (*Preferred Alternative*)

Impacts on regulated groundfish

Under Option 2, the middle, separator panel would be required to be woven of a contrasting color material, so that it can be more readily identified by enforcement officers. This alternative has neutral biological impacts on regulated groundfish relative to Option 1/No Action, because the change does not have any effect on the way the gear fishes that would influence the degree of bottom contact, swept area, or efficiency. If this changes leads to improved usage of the gear by fishermen (i.e., via compliance and enforcement), this measure may result in additional positive benefits for regulated groundfish species, specifically cod and flatfish species, such as windowpane flounder and GB yellowtail flounder.

Impacts on other species

Option 2 has neutral biological impacts on other species relative to Option 1/No Action, because the change does not have any effect on the way the gear fishes that would influence the degree of bottom contact, swept area, or efficiency.

7.1.3 Commercial and Recreational Fishery Measures

7.1.3.1 Groundfish Sector Monitoring Program

In this section, the Council combined the various action alternatives (specifically Options 2, 3A, 4A, and 5). The action alternatives in general are intended to maintain monitoring coverage levels needed to estimate catches of groundfish stocks, and reduce or eliminate monitoring in areas where it is not needed to manage costs. Thus, the action alternatives in combination may lead to increases in fishing effort where it otherwise would have been constrained due to costs associated with ASM. Increased ASM cost sharing is forthcoming under any of these alternatives, which could lead to reduced fishing effort. However, it is difficult to predict how the industry will operate under Option 1, in terms of whether it will constrain effort, let alone under the other options in this section.

7.1.3.1.1 Option 1: No Action

Impacts on regulated groundfish

Option 1/No Action would maintain the existing monitoring program as defined in Amendment 16 and Framework 48. The cost sharing envisioned under Amendment 16, which is just now being implemented in FY 2015, combined with no other changes to the goals or requirements of the program, could lead to reduced fishing effort under No Action as compared to current conditions, and therefore to reductions in biological impacts. Since Option 1 would lead to higher coverage rates it would continue to provide positive benefits for regulated groundfish species. Action alternatives (Options 2, 3A/B, 4A/B, and 5) would also provide some positive benefits for regulated groundfish species, but these are likely low positive, neutral, or negative when compared to Option 1, depending on the options are their combination.

Generally, higher target observer coverage rates and realized coverage rates would result in multiple positive impacts on regulated groundfish species. These include benefits for stock assessments including less uncertainty with the discard estimates, less uncertainty in the size-age structure of discards and better linkage between monitoring catch and quota estimation. Further for non-allocated stocks – which are essentially discards only, estimates of catches rely on observations at sea (Figure 22). Stratification in stock assessments is based on gear and mesh.

As a comparison, the CV for FY 2014 with and without ASM are provided in Table 84. Generally, increased coverage leads to a reduction in the CV for each stock and therefore improved estimations of discards. Furthermore, a benefit of higher coverage is to reduce the potential for observer bias. Although it is not possible to quantify observer bias at this time, the uncertainty change from year to year leading to over or under- estimates of discards.

The preliminary summary of multispecies FY 2014 discard performance for use in determining FY 2016 total observer coverage is summarized in Table 85, Table 86, Figure 21, Figure 22, and Figure 23. The overall realized coverage level for FY 2014 is 25.7% (Table 85). The stock CVs for FY 2014 is summarized in Table 86. Redfish has a CV of 41.69 with an estimated coverage rate of 37 percent needed to reach a CV 30. GOM winter flounder has a CV of 29.06 with an estimated coverage rate of 26 percent needed to achieve a CV 30.

As shown in Figure 21, a 41 percent coverage rate is estimated to be required to observe 80 percent of the total aggregated discards at a CV 30 or better at the sector/stock/gear level, based on data from FY 2014. Figure 21 also indicates that at a CV30 that with a target observer coverage level greater than approximately 55% the benefit of observing additional discards is negligible, similarly at a CV20 that with a target observer coverage level greater than approximately 70% the benefit of observing discards is negligible. Figure 22 and Figure 23 summarize the observed and unobserved discards in terms of percent sub-ACL and total discards. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of all discards be observed at); otherwise coverage would be 37%. Acadian redfish is the driver for this rate.

Impacts on other species

Since Option 1/No Action would lead to higher coverage rates it would continue to provide more precise estimates of other species if they are discarded on groundfish trips for other species if they are sampled on trips. Action alternatives (Options 2, 3A/B, 4A/B, and 5) would also provide positive benefits for other species, but these are likely low positive to neutral when compared to Option 1/No Action.

Table 84- Comparison of realized CVs for each stock with NEFOP and ASM and with NEFOP only for FY 2014. These are considered draft, provided for informational purposes, and subject to change. Source,: CVs - NEFOP+ ASM, GARFO, January 6, 2016 and NEFOP, NEFSC, May 28, 2015.

FY 2014 Stock	Realized CV NEFOP+ASM	Realized CV NEFOP
GB cod	14.38	63.88
GOM cod	11.16	30.98
Plaice	7.35	19.12
GB winter flounder	20.79	23.34
GOM winter flounder	29.06	28.21
Witch flounder	8.96	21.60
CC/GOM yellowtail flounder	14.10	24.79
GB yellowtail flounder	21.16	20.09
SNE/MA yellowtail flounder	23.20	33.36
GB haddock	8.44	21.79
GOM haddock	12.03	30.72
White hake	15.36	26.82
Pollock	9.71	31.06
Redfish	41.69	72.19
SNE/MA winter flounder	16.69	38.12
S windowpane flounder	8.26	16.87
N windowpane flounder	12.75	53.65
Ocean pout	16.50	78.73
Halibut	6.97	19.35
Wolffish	9.75	28.38

Table 85- Target and realized coverage levels, FY 2010-FY 2014. Source: GARFO, November 16, 2015.

Fishing Year	NEFOP target coverage level	ASM target coverage level	Total target coverage level	Realized coverage level
FY 2010	8 %	30 %	38 %	32 %
FY 2011	8 %	30 %	38 %	27 %
FY 2012	8 %	17 %	25 %	22 %
FY 2013	8 %	14 %	22 %	20 %
FY 2014	8 %	18 %	26 %	25.7 %
FY 2015	4 %	20%	24 %	n/a*

Table 86- Realized stock CVs and percent coverage required to achieve CV30, FY 2010 - FY 2014. Source: GARFO, January 6, 2016. Shaded rows indicate stock components.

	FY 2010		FY 2011		FY 2012		FY 2013		FY 2014	
	Realized	CV 30	Realized	CV 30	Realized	CV 30	Realized	CV 30	Realized	CV 30
STOCK	CV	Percent Coverage Required	CV	Percent Coverage Required	CV	Percent Coverage Required	CV	Percent Coverage Required	CV	Percent Coverage Required
GB Cod	5.61	1.7	8.39	3.05	10.52	2.81	14.59	4.25	14.38	5.08
GB Cod East	9.73	3.9	15.44	11.29	20.44	10.05	48.86	28.08	24.6	14.36
GB Cod West	6.27	2.16	9.85	4.09	12.22	3.76	15.19	4.65	16.73	6.72
GOM Cod	4.74	1.33	4.74	1.04	9.89	3.05	6.07	1.11	11.16	5.02
Plaice	4.96	1.23	4.36	0.76	5.52	0.82	6.51	1.07	7.35	1.84
GB Winter Flounder	16.29	8.77	27.67	21.71	21.3	8.87	23.02	10.63	20.79	11.19
GOM Winter Flounder	10.56	6.19	8.81	3.5	8.96	2.54	15.1	6.4	29.06	25.99
Witch Flounder	5.76	1.6	5.11	1.06	8.74	2.04	7.41	1.35	8.96	2.55
CC/GOM Yellowtail Flounder	8.66	4.19	6.9	2.07	7.8	1.83	9.31	2.43	14.1	7.33
GB Yellowtail Flounder	11.13	4.29	10.36	3.69	15.98	5.11	24.84	12.42	21.16	11.59
SNE/MA Yellowtail Flounder	13.95	10.44	9.39	4.15	12.91	4.25	31.45	21.75	23.2	16.84
GB Haddock	9.4	4.61	10.22	4.55	21.77	11.78	11.95	3.66	8.44	2.47
GB Haddock East	12.73	6.43	17.36	13.97	35.04	24.77	30.17	13.01	10.64	3.27
GB Haddock West	13.31	9.05	10.1	4.37	27.08	17.19	13	4.46	9.95	3.51
GOM Haddock	9.94	5.56	9.11	3.68	12.27	4.61	12.98	4.84	12.03	5.76
White Hake	9.21	4.15	7.76	2.36	13	4.3	11.81	3.38	15.36	7.6
Pollock	8.01	3.19	6.91	1.88	7.71	1.57	7.55	1.4	9.71	3.19
Redfish	11.51	6.15	8.98	3.11	13.85	4.91	21.23	9.94	41.69	37.04
SNE/MA Winter Flounder	10.61	7.2	12.85	7.74	15.44	7.02	21.21	12.82	16.69	10.61
Southern Windowpane	9.12	4.75	8.22	3.23	10.7	2.99	7.98	1.81	8.26	2.45
Northern Windowpane	13.22	8.08	9.04	3.05	11.01	3.13	16.69	6.35	12.75	4.29
Ocean Pout	9.69	4.58	9.38	3.36	11.7	3.57	11.57	2.8	16.5	7.76
Halibut	6.34	2.01	6.95	1.93	6.68	1.18	7.51	1.24	6.67	1.56
Wolffish	6.66	2.18	7	1.9	8.35	1.9	9.58	2.2	9.75	3.19

Figure 21- FY 2014 percent discards at CV level (CV30 and CV20), discards (in thousands of lb), sea days (in thousands of days) and associated cost estimate (in thousands of dollars). Source: GARFO, November 16, 2015.

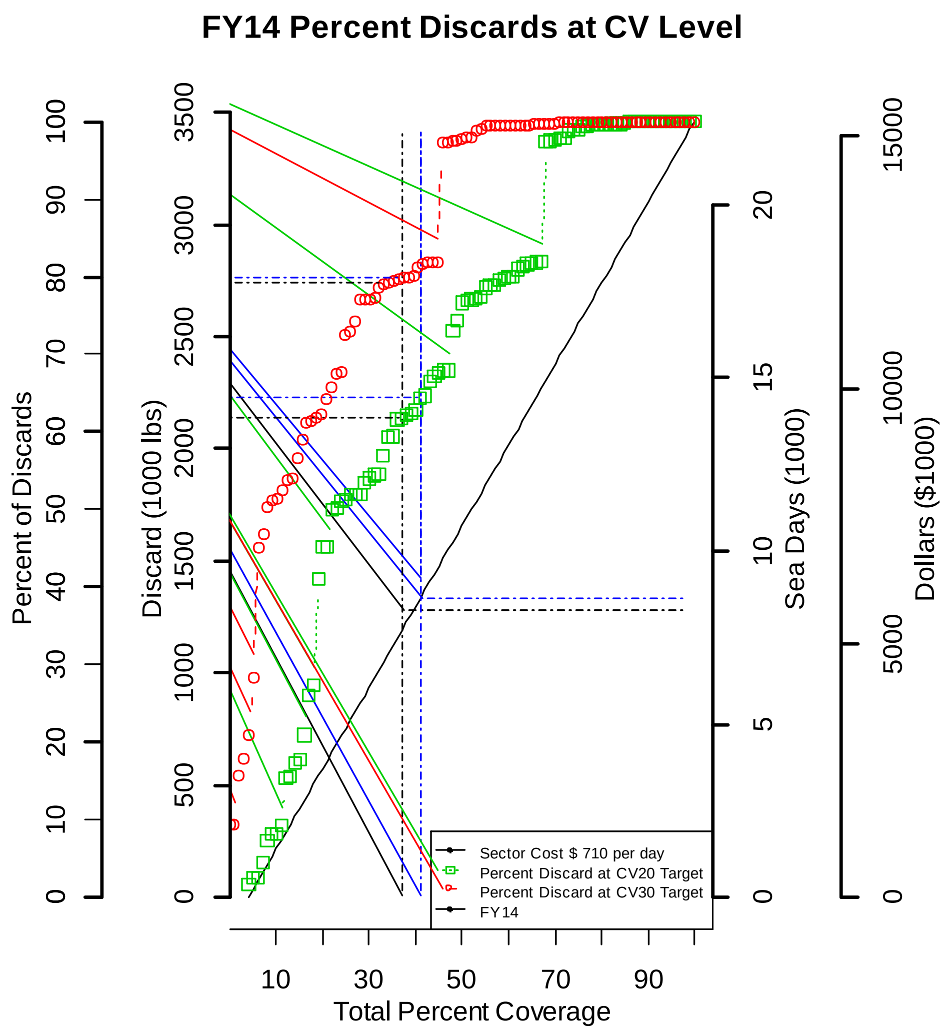


Figure 22- FY 2014 groundfish discards as a percentage of catch. Source: GARFO, November 16, 2015.

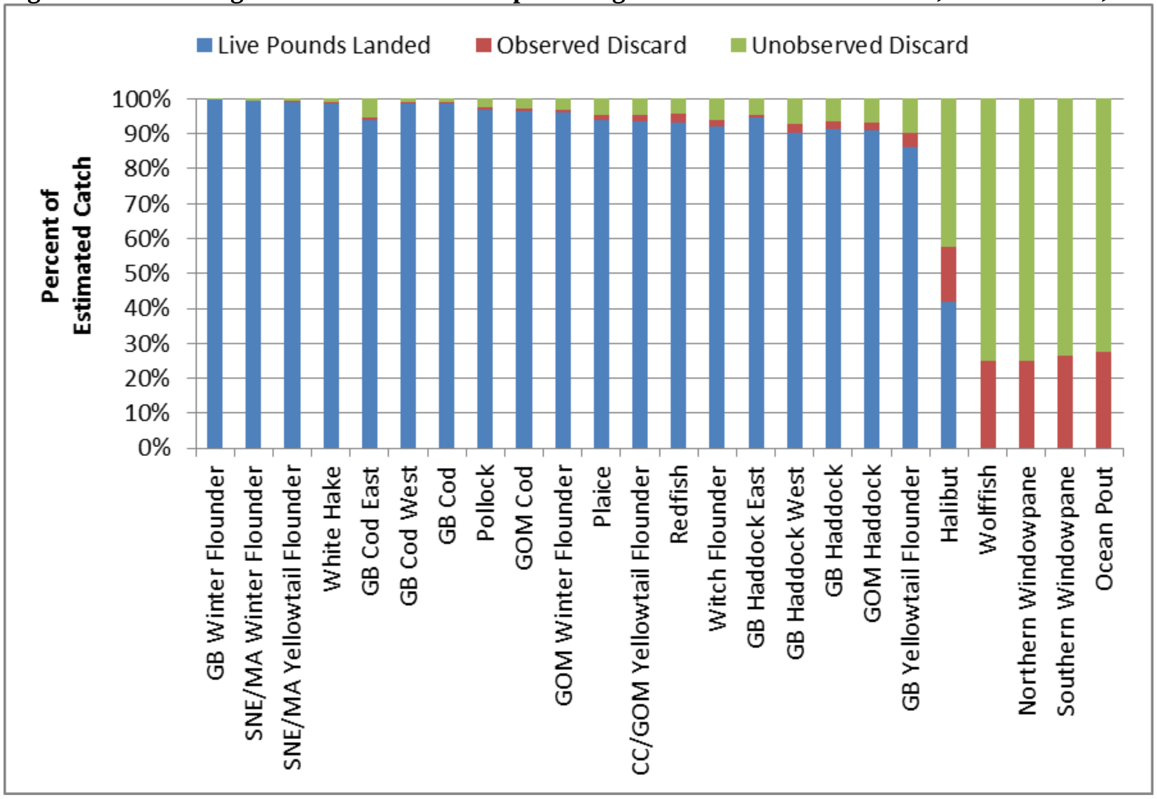
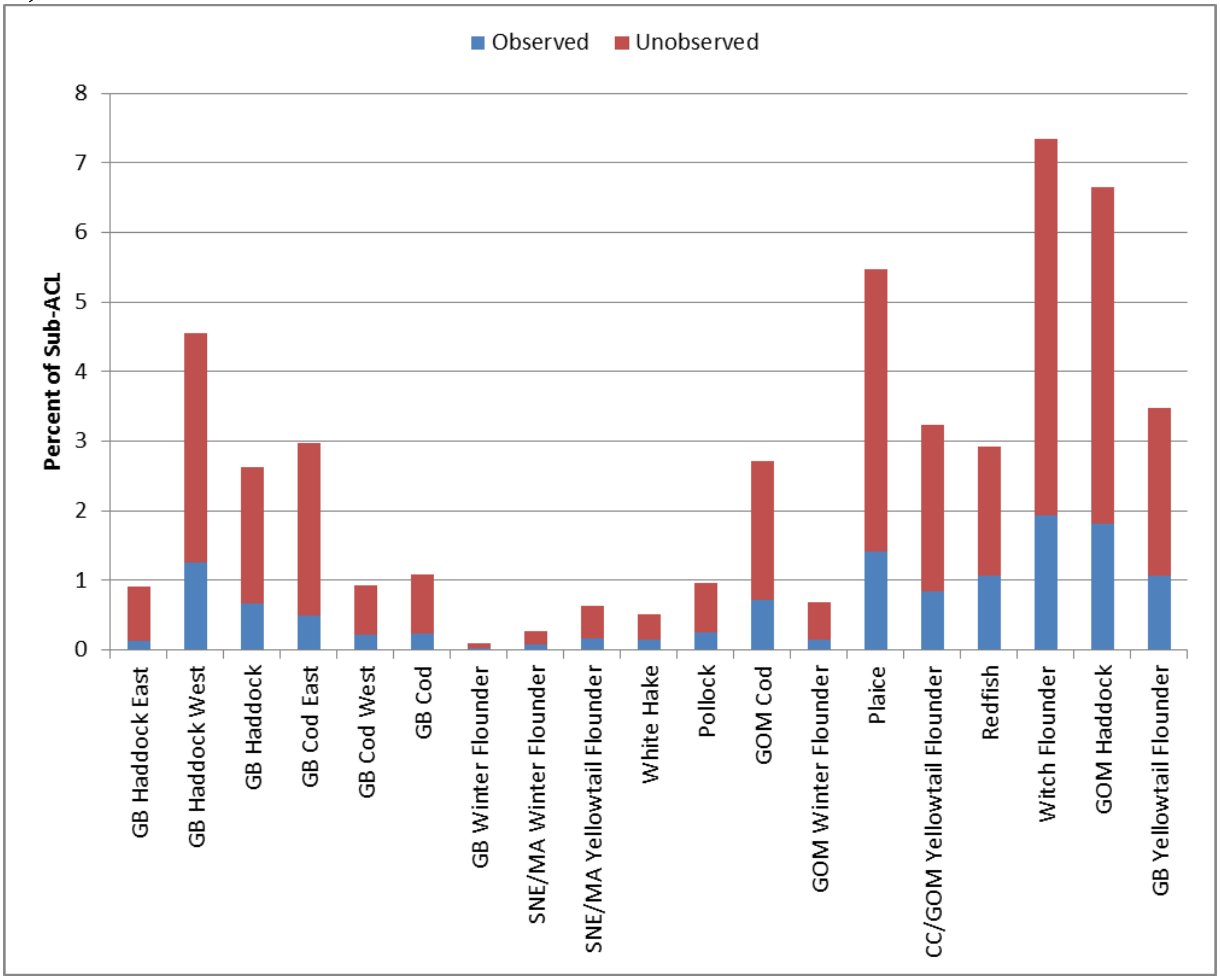


Figure 23- FY 2014 allocated groundfish discards as a percentage of sub-ACL. Source: GARFO, November 16, 2015.



7.1.3.1.2 Option 2: Clarify Groundfish Monitoring Goals and Objectives (*Preferred Alternative*)

Impacts of regulated groundfish

Option 2 would clarify that the primary goal of ASM is to verify area fished, catch, and discards by species and gear type, and that this goal should be met via the most cost effective means practicable. This clarification may help to limit ASM coverage to instances where it is necessary to achieve these objectives, therefore reducing cost burdens associated with ASM. As this option represents a change to the goals of the program only, it will have an indirect impact on coverage levels and distribution of covered trips. While adherence to this goal may mitigate any negative impacts of ASM requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to maintaining the ASM program as-is via the No Action alternative. Since the goal for benefits to stock assessments would still be considered a goal albeit secondary, the impacts are likely to be neutral to slightly negative on regulated groundfish species.

Impacts on other species

As Option 2 would clarify the primary goal of ASM is to verify area fished, catch, and discards by species and gear type, and that this goal should be met via the most cost effective means practicable. This clarification may help to limit ASM coverage to instances where it is necessary to achieve these objectives, therefore reducing cost burdens associated with ASM. As this option represents a change to the goals of the program only, it will have an indirect impact on coverage levels and distribution of covered trips. With respect to impacts on other species, overall coverage levels have been and will continue to be based on ASM requirements for groundfish stocks. As other species are co-caught with groundfish on observed trips, additional data is collected on these species relative to baseline coverage that would otherwise be achieved using only SBRM. Under Option 2, impacts are likely to be neutral when compared with Option 1.

7.1.3.1.3 Option 3: Clarify methods used to set sector coverage rates (*Preferred Alternative*)

- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)

Impacts of regulated groundfish

In past years, NMFS has applied an additional standard of monitoring 80% of discards at the sector/stock/gear level. As shown in Figure 21, a 41 percent coverage rate is estimated to be required to observe 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% using the Agency's current approach (set coverage level so that 80 percent of the discard estimates have CV30 at the sector/stock/gear level)); otherwise coverage would be 37%. Acadian redfish is the driver for this rate. Figure 21 indicates that at a CV30 with a target coverage level of 37% that approximately 78% of discards would be observed, similarly at a CV20 that 63% of the discards would be observed. Sub-Option 3A would likely provide slightly fewer positive benefits for regulated species that Option 1, but greater positive benefits than options 3B, 4A/B, and 5.

Impacts on other species

Information collected on other species would be collected at a lower total coverage rate than Option 1/No Action. When compared to Option 1, Sub-Option 3A would likely provide fewer positive benefits for other species than Option 1, but greater positive benefits than options 3B, 4A/B, and 5.

- Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

Impacts on regulated groundfish

This sub-option would refine the approaches used to set target coverage rates and should help to make these rates more stable over time. Changes in the coverage rates needed to achieve a 30% CV from one year to the next suggests that one year's estimate may not predict very well the coverage rates needed in a subsequent year. An indication of this is evident in the table below with the changes in the maximum coverage needed among the different stocks across years.

With 5 years of data we can now test how well a single year estimator performs for estimating the coverage rates needed for year t+1. A performance comparison was done for three different coverage rate estimators (3 year average, 2 year average, and a single year) to achieve a 30% stock wide CV in 2014 (((estimator-2014)/2014) X 100). A current year bridge year assumption is made for when the estimate is done (2013). For example, 2012 is used to estimate 2014 for the single year estimator. For the two year average estimator, the 2011-2012 average estimate was used to predict the coverage rate needed in 2014 and for the 3 year average, 2010-2012 was used. Therefore with only five years of data the 5 year average estimator cannot be tested until 7 years of data are available. Using more than one year of data tends to smooth out some of the noise assuming there are no large trends over the years that are being averaged. Overall, across stocks it appears the three year average performed relatively well for predictions of the 30% CV coverage rates needed in 2014 relative to using the 2 year and single year estimator. However more years of data and analysis is needed to make a final conclusion. It appears the 3 year average estimator did not perform worse relative to the single year estimator but implications for coverage rate do vary among the estimators (Table 87).

As shown in Table **87** and Figure 24, the performance of estimators varies by stock. For example, , GB haddock (stock #12 in Figure 23 and Table **87**) showed relatively large deviations from the 2014 estimates. Specifically, the 3-year average estimator performed better than the 2 year or single year estimator . Perhaps the poorer performance of using fewer years with GB haddock for this comparison is due to a strong relationship with discards of strong year classes as they grow and become recruited to the fishery over time. This could occur over a two year timespan. Whether several years or a single year of data performs better for a species like haddock may depend on the size and age of strong year classes at the time of the analysis.

Option 3B would result in reductions in the target observer coverage levels. As shown in Figure 21, a 41 percent coverage rate is estimated to be required such that 80 percent of discards have a CV 30 or better at the sector/stock/gear level based on data from FY 2014. Based on the analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of discard estimates have a CV30 at the sector/stock/gear level); otherwise coverage would be 37% and Acadian redfish would be the driver for this rate.

The total coverage rates using a multi-year approach for FY 2016 range from 11% to 23%. Figure 21 indicates that at a CV30 that with a target coverage level of 11% that approximately 50% of discards would be observed, similarly at a CV20 that 9% of the discards would be observed. Figure 21 indicates that at a CV30 that with a target coverage level of 23% that approximately 70% of discards would be observed, similarly at a CV20 that 50% of the discards would be observed. Sub-Option 3B would provide fewer positive benefits for regulated species that Option 1. Depending on the approach chosen, it could result in neutral to low negative impacts on regulated groundfish species relative to Option 1.

The current analysis to determine observer coverage rates depends on using the last full year of data at the time of analysis (e.g., coverage for FY 2015 determined using FY 2013 information). One concern is whether coverage rates at the stock level in one given year should be the driving factor when determining an overall rate for the fishery. Multiple years of information could be used to determine a target coverage rate (i.e., average or median of the CV 30 percent coverage requirement by stock across several years – 2, 3, or 5 years). This would stabilize and smooth out the estimates for the required coverage needed to obtain a CV of 30%. There is a tradeoff with smoothing out the noise in the CV estimates and ability to response to real changes in trends with the CVs over time. A five year smooth may be slow in picking up real changes in the CV over time. By definition it will take five years for a very high or low CV estimate to leave the estimator. Comparison of the three year moving average and the two year moving average in Table 88 to the yearly estimates in Table 4 should be considered for determining the tradeoffs for smoothing the estimator.

Impacts on other species

Information collected on other species would be collected at a lower total coverage rate than Option 1. Sub-Option 3B would likely provide fewer positive benefits for other species that Option 1.

Table 87**- Example of using multiple years of information to determine total coverage rates.**

(blue) = maximum stock within year
(grey) = stock components

Stock	2010 CV 30 Percent Coverage Required	2011 CV 30 Percent Coverage Required	2012 CV 30 Percent Coverage Required	2013 CV 30 Percent Coverage Required	2014 CV 30 Percent Coverage Required	5 YEAR AVG	5 YEAR MEDIAN	3 YEAR AVG	3 YEAR MEDIAN	2 YEAR AVG	single year
GB Cod	1.7	3.05	2.81	4.25	5.08	3.38	3.05	4.05	4.25	4.67	5.08
GB Cod East	3.9	11.29	10.05	28.08	14.36	13.54	11.29	17.50	14.36	21.22	14.36
GB Cod West	2.16	4.09	3.76	4.65	6.72	4.28	4.09	5.04	4.65	5.69	6.72
GOM Cod	1.33	1.04	3.05	1.11	5.02	2.31	1.33	3.06	3.05	3.07	5.02
Plaice	1.23	0.76	0.82	1.07	1.84	1.14	1.07	1.24	1.07	1.46	1.84
GB Winter Flounder	8.77	21.71	8.87	10.63	11.19	12.23	10.63	10.23	10.63	10.91	11.19
GOM Winter Flounder	6.19	3.5	2.54	6.4	25.99	8.92	6.19	11.64	6.40	16.20	25.99
Witch Flounder	1.6	1.06	2.04	1.35	2.55	1.72	1.60	1.98	2.04	1.95	2.55
CC/GOM Yellowtail Flounde	4.19	2.07	1.83	2.43	7.33	3.57	2.43	3.86	2.43	4.88	7.33
GB Yellowtail Flounder	4.29	3.69	5.11	12.42	11.59	7.42	5.11	9.71	11.59	12.01	11.59
SNE/MA Yellowtail Flounde	10.44	4.15	4.25	21.75	16.84	11.49	10.44	14.28	16.84	19.30	16.84
GB Haddock	4.61	4.55	11.78	3.66	2.47	5.41	4.55	5.97	3.66	3.07	2.47
GB Haddock East	6.43	13.97	24.77	13.01	3.27	12.29	13.01	13.68	13.01	8.14	3.27
GB Haddock West	9.05	4.37	17.19	4.46	3.51	7.72	4.46	8.39	4.46	3.99	3.51
GOM Haddock	5.56	3.68	4.61	4.84	5.76	4.89	4.84	5.07	4.84	5.30	5.76
White Hake	4.15	2.36	4.3	3.38	7.6	4.36	4.15	5.09	4.30	5.49	7.60
Pollock	3.19	1.88	1.57	1.4	3.19	2.25	1.88	2.05	1.57	2.30	3.19
Redfish	6.15	3.11	4.91	9.94	37.04	12.23	6.15	17.30	9.94	23.49	37.04
SNE/MA Winter Flounder	7.2	7.74	7.02	12.82	10.61	9.08	7.74	10.15	10.61	11.72	10.61
Southern Windowpane	4.75	3.23	2.99	1.81	2.45	3.05	2.99	2.42	2.45	2.13	2.45
Northern Windowpane	8.08	3.05	3.13	6.35	4.29	4.98	4.29	4.59	4.29	5.32	4.29
Ocean Pout	4.58	3.36	3.57	2.8	7.76	4.41	3.57	4.71	3.57	5.28	7.76
Halibut	2.01	1.93	1.18	1.24	1.56	1.58	1.56	1.33	1.24	1.40	1.56
Wolffish	2.18	1.9	1.9	2.2	3.19	2.27	2.18	2.43	2.20	2.70	3.19

Table 88- Comparison of the performance of three different coverage rate estimators (3 year average, 2 year average, and single year) as a percent deviation from the 30%CV in FY 2014. (((estimator-2014 cv30)/2014 cv30)*100). Blue highlighted cells are the best preforming estimator (closest to zero) for each stock relative to predicting CV30 in 2014.

		Estimator		
Stock #	stock	3 year average	2 year average	1 year
1	GB Cod	-50%	-42%	-45%
2	GB Cod East	-41%	-26%	-30%
3	GB Cod West	-50%	-42%	-44%
4	GOM Cod	-64%	-59%	-39%
5	Plaice	-49%	-57%	-55%
6	GB Winter Flounder	17%	37%	-21%
7	GOM Winter Flounder	-84%	-88%	-90%
8	Witch Flounder	-39%	-39%	-20%
9	CC/GOM Yellowtail Flounder	-63%	-73%	-75%
10	GB Yellowtail Flounder	-62%	-62%	-56%
11	SNE/MA Yellowtail Flounder	-63%	-75%	-75%
12	GB Haddock	183%	231%	377%
13	GB Haddock East	360%	492%	657%
14	GB Haddock West	191%	207%	390%
15	GOM Haddock	-20%	-28%	-20%
16	White Hake	-53%	-56%	-43%
17	Pollock	-31%	-46%	-51%
18	Redfish	-87%	-89%	-87%
19	SNE/MA Winter Flounder	-31%	-30%	-34%
20	Southern Windowpane	49%	27%	22%
21	Northern Windowpane	11%	-28%	-27%
22	Ocean Pout	-51%	-55%	-54%
23	Halibut	9%	0%	-24%
24	Wolffish	-38%	-40%	-40%

Figure 24- Comparison of three different coverage estimators (3 year average, 2 year average, and single year) to achieve a 30%CV in FY 2014, represented as a deviation from 2014. Stock numbers correspond to those in Table 88.

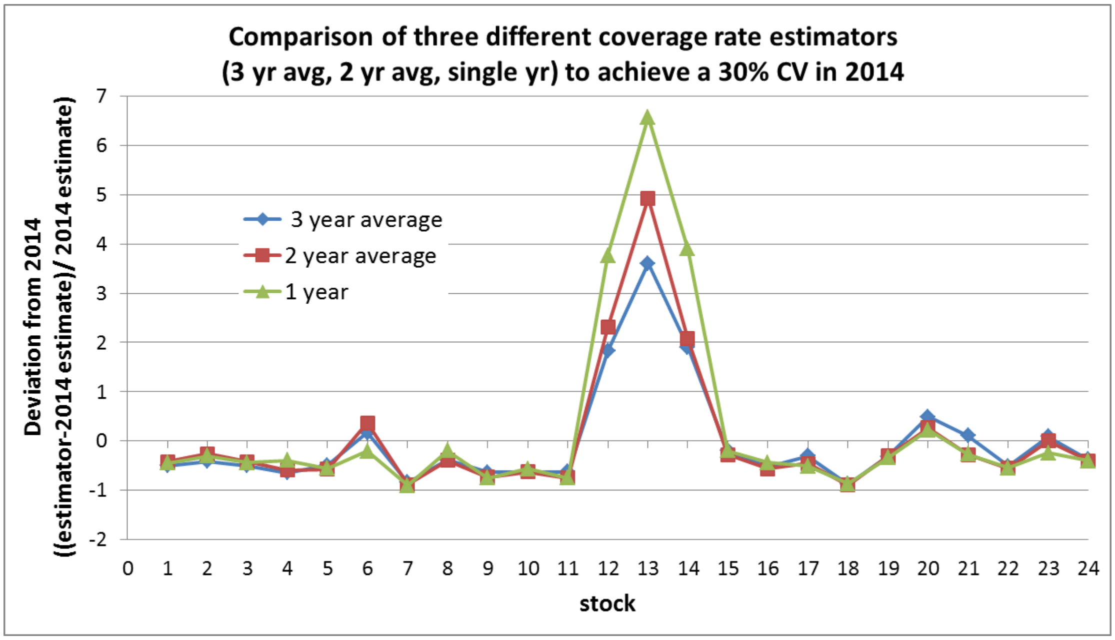


Table 89- Comparison of percent coverage require of the three year moving average and the two year moving average smoother to achieve a CV30 for the five years of available data. This can be compared to the single year estimate in Table 4. Blue cells are the maximum excluding the gray sub-stocks cells.

	3 year moving average			2 year moving average			
Stock	10-12	11-13	12-14	10-11	11-12	12-13	13-14
GB Cod	2.52	3.37	4.05	2.38	2.93	3.53	4.67
GB Cod East	8.41	16.47	17.50	7.60	10.67	19.07	21.22
GB Cod West	3.34	4.17	5.04	3.13	3.93	4.21	5.69
GOM Cod	1.81	1.73	3.06	1.19	2.05	2.08	3.07
Plaice	0.94	0.88	1.24	1.00	0.79	0.95	1.46
GB Winter Flounder	13.12	13.74	10.23	15.24	15.29	9.75	10.91
GOM Winter Flounder	4.08	4.15	11.64	4.85	3.02	4.47	16.20
Witch Flounder	1.57	1.48	1.98	1.33	1.55	1.70	1.95
CC/GOM Yellowtail Flounder	2.70	2.11	3.86	3.13	1.95	2.13	4.88
GB Yellowtail Flounder	4.36	7.07	9.71	3.99	4.40	8.77	12.01
SNE/MA Yellowtail Flounder	6.28	10.05	14.28	7.30	4.20	13.00	19.30
GB Haddock	6.98	6.66	5.97	4.58	8.17	7.72	3.07
GB Haddock East	15.06	17.25	13.68	10.20	19.37	18.89	8.14
GB Haddock West	10.20	8.67	8.39	6.71	10.78	10.83	3.99
GOM Haddock	4.62	4.38	5.07	4.62	4.15	4.73	5.30
White Hake	3.60	3.35	5.09	3.26	3.33	3.84	5.49
Pollock	2.21	1.62	2.05	2.54	1.73	1.49	2.30
Redfish	4.72	5.99	17.30	4.63	4.01	7.43	23.49
SNE/MA Winter Flounder	7.32	9.19	10.15	7.47	7.38	9.92	11.72
Southern Windowpane	3.66	2.68	2.42	3.99	3.11	2.40	2.13
Northern Windowpane	4.75	4.18	4.59	5.57	3.09	4.74	5.32
Ocean Pout	3.84	3.24	4.71	3.97	3.47	3.19	5.28
Halibut	1.71	1.45	1.33	1.97	1.56	1.21	1.40
Wolffish	1.99	2.00	2.43	2.04	1.90	2.05	2.70

7.1.3.1.4 Option 4: Remove ASM coverage requirements for a sub-set of sector gillnet trips

- Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear (*Preferred Alternative*)
- Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries

Under Sub-Option 4A, ASM coverage would not be required for sector vessels that declare an ELM gillnet fishing mesh of 10” or greater on trips in BSA 2 and 4. Sub-Option 4B is similar in that sector vessels would not be required to carry an ASM, and applies to sector vessels fishing with gillnets (6.5’’>) within the footprint of the Cape Cod Spiny Dogfish Exemption Area and SNE Dogfish Gillnet Fishery Exemption Area. On both types of trips, groundfish catches are low (Figure 25 and Figure 27). These options, singly or in combination, could help to maintain the amount of fishing on these types of trips at status quo levels, limiting any dampening effect ASM requirements have on these fisheries.

These options have the potential to introduce sampling bias if not applied across all BSAs in the same manner, which could limit the ability of using the information in stock assessments. Sampling bias could occur unless the exemption was broadly applied to the ELM gear. BSA 1 (GOM) and BSA 3 (GB) would still have the ASM requirement, but other areas would not. Another possible result could be incentivizing fishing outside of BSA 1 and BSA 3.

Impacts on regulated groundfish

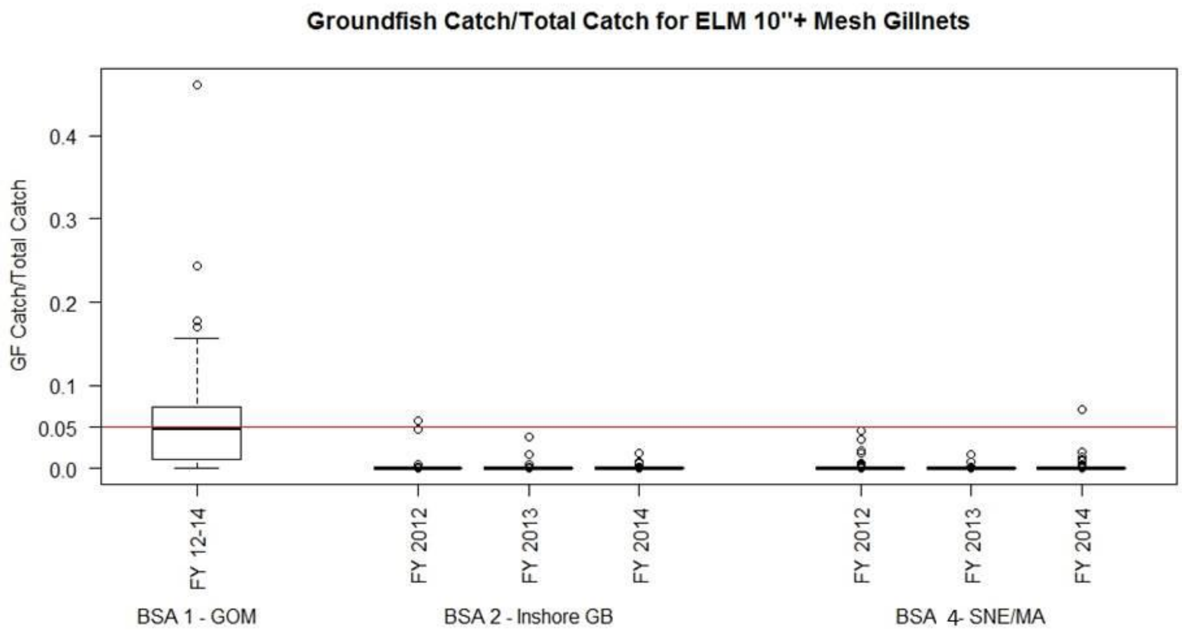
Under Sub-Option 4A and 4B, impacts relative to Option 1 are likely to be low negative since ELM trips in BSAs 2 and 4 would not be subject to ASM coverage. This is because reducing observer coverage also reduces the precision of discard estimates. An analysis to show the impact of the alternative on the overall FY 2016 sector ASM coverage rate indicates no change in the overall coverage rate for those that would be subject to coverage (i.e., the CV for redfish in FY 2014 is 41.69 with 37% total observer coverage required to achieve a CV30 – see Table 86).

Catches of regulated groundfish stocks on observed sector trips fishing exclusively ELM have been consistently low in BSAs 2 and 4 (Figure 25). Median groundfish catches within this universe of sector trips were zero for each individual fishing year in BSAs 2 and 4, with two trips in the time series with groundfish catches in excess of 5% of total catch (Figure 25).

Impacts on other species

Under Sub-Option 4B and 4B, impacts on other species, such as skates, monkfish, and dogfish relative to Option 1 are likely to be low negative since ELM sector trips would not be subject to ASM coverage and the precision associated with non-groundfish discards would also decrease. The economic incentive to use ELM gillnets to target other species may increase effort – and subsequently – catch of these species. However, recent catch of skates, monkfish, and dogfish have been below total allowable catches for these species, such that additional catch would not be expected to result in catches exceeding ACTs for these species.

Figure 25- Groundfish catch as a proportion of total catch on observed sector trips by fishing year and BSA.

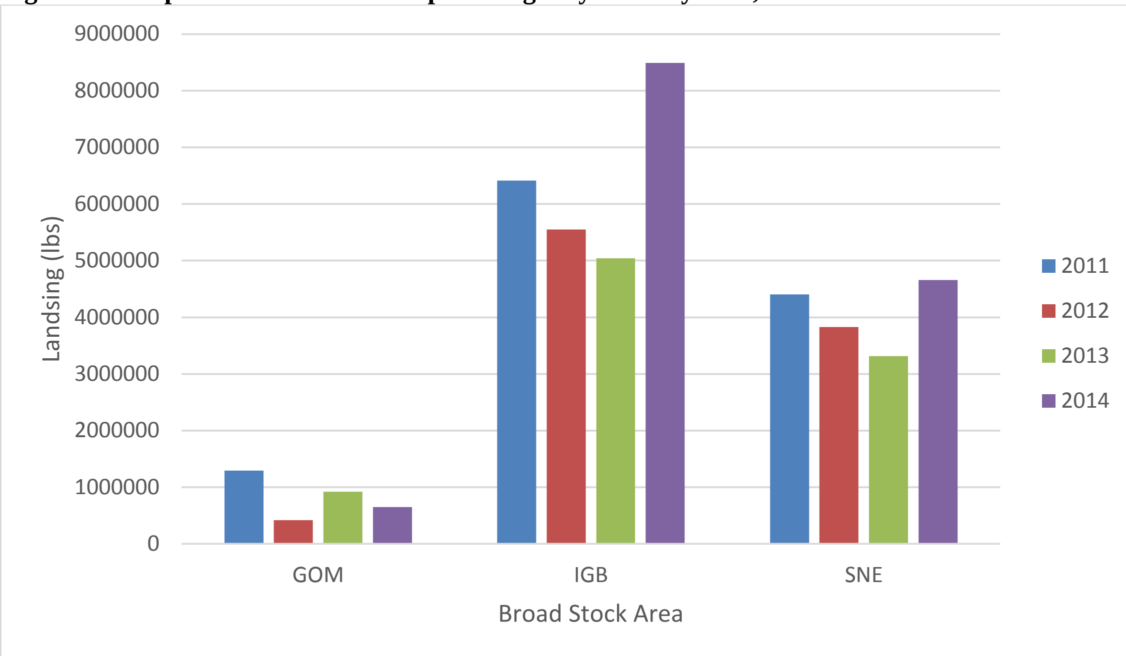


Kept catch on sector gillnet trips fishing only mesh size of 8” or greater varies greatly by BSA fished (Table 90), with the majority of landings coming from BSA 2, inshore Georges Bank. Figure 26 depicts annual landings of ELM 8”+.

Table 90 - Commercial landings on sector groundfish gillnet trips fishing mesh size of 8" or greater.

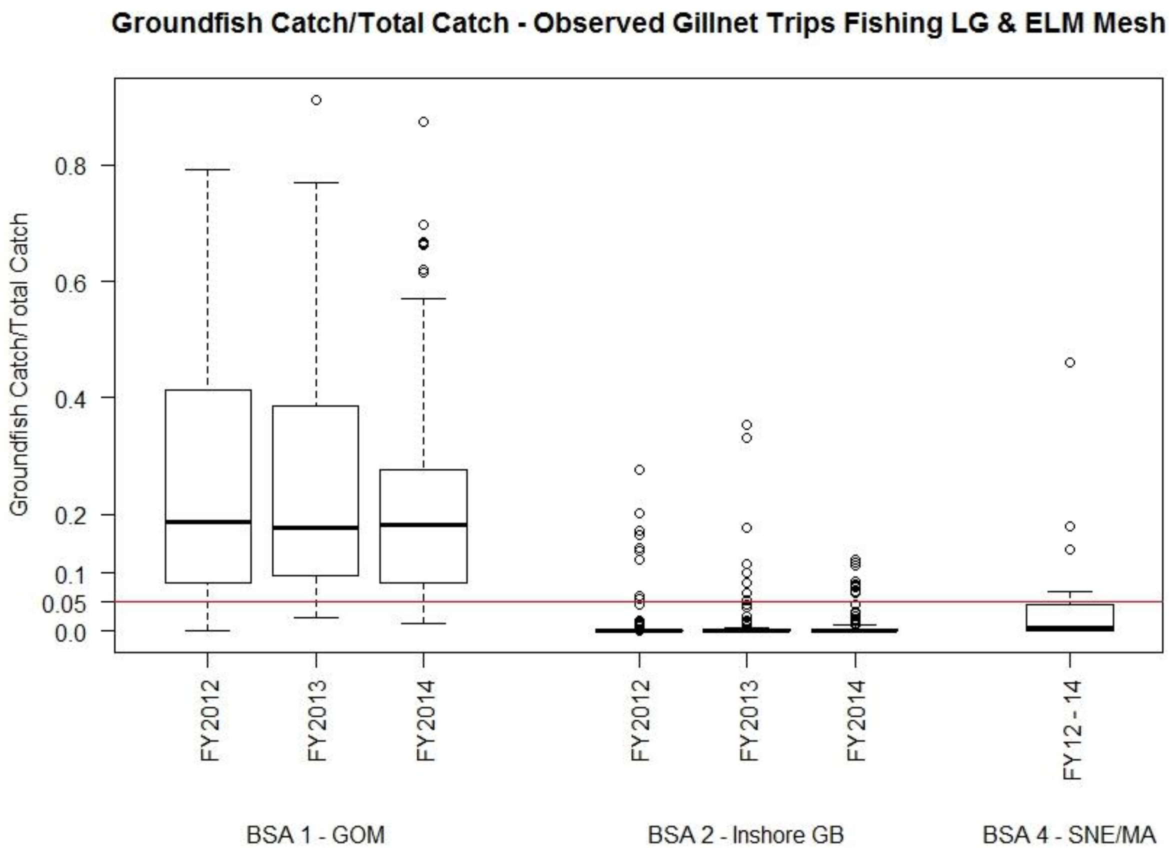
Commercial Landings on Sector Groundfish GNS ELM Trips				
MULT_YEAR	BSA	KALL	VESSEL_COUNT	
2011	GOM	1,296,111	24	
2011	IGB	6,413,731	15	
2011	SNE	4,404,371	38	
2012	GOM	418,433	25	
2012	IGB	5,549,951	14	
2012	SNE	3,829,406	39	
2013	GOM	922,521	16	
2013	IGB	5,042,322	14	
2013	SNE	3,313,405	35	
2014	GOM	652,975	18	
2014	IGB	8,492,619	17	
2014	SNE	4,659,861	29	
Total	GB	22,864	5	
Total	GOM	3,290,040	38	
Total	IGB	25,498,623	20	
Total	SNE	16,207,043	45	
Note GB by year are confidential due to fewer than three vessel reports.				
Based on DMIS SSB tables as of 10/23/15				

Figure 26 - Kept catch from sector trips fishing only ELM by BSA, FY 2011 - FY2014



Sector vessels fishing on a sector trip may fish multiple mesh sizes on the same trip. If sub-Option 4b is approved, ASM coverage for sub-set of these trips fishing within the footprint of existing dogfish exempted fisheries which are within BSAs 2 and 4 would not be required. The boxplot in Figure 27 indicates that groundfish catch represents less than 5% of total catch on the majority of trips fishing multiple mesh sizes in BSA 2 and 4.The number of observed trips fishing multiple mesh sizes in the GOM ranged from 74 – 132, from 97 – 143 in the Inshore GB, and 21 in trips in SNE.

Figure 27 - Groundfish catch to total catch ratios for sector trips fishing both LG and ELM gillnets by fishing year and broad stock area (BSA). Due to a low sample size, SNE/MA trips were binned.



7.1.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

Impacts of regulated groundfish

Option 5 would set specific criteria under which certain stocks would not be predictors for the annual ASM coverage level. The criteria are related to stock condition (exceeding reference points), low discards (5-10% of catch), and moderate percentage of the ACL harvested (50-75%). In practice, other stocks not meeting these criteria would be the primary determinants of coverage levels. In some instances, Option 5 may lower coverage requirements for sector vessels, which may increase fishing effort somewhat relative to maintaining the monitoring program as-is (No Action alternative). The Council's preferred alternative is less than 75% of the ACL harvested and no more than 10% of catch comprised of discards.

Figure 2 depicts the process for applying the prioritization criteria, and Table 91 describes how the criteria would impact coverage rates since 2012. To determine this, the PDT looked at whether or not the stock with the highest coverage needed to achieve a CV30 would have been standard driver of coverage levels in that FY based on performance criteria developed by the PDT.

Prioritization Thresholds:

1. Stock condition

a. Not overfished and overfishing is not occurring (7 stocks)

2. Percentage of ACL harvested
   i. 50% of sub-ACL caught
   ii. 75% of sub-ACL caught
3. Percentage of catch comprised of discards
   i. >5% of total catch
   ii. >10% of total catch

When developing catch and discard thresholds, the PDT considered additional uncertainty in discard estimates associated with high realized CVs (above the CV30). As percentages of the ACL harvested and the percentages of catch comprised as discards vary widely across stocks, a 'hybrid' approach could be to use multiple thresholds within a single option. For example, if 1) sector discards of a stock are less than 10% of total sector catch, but the fishery is catching less than 50% of the sub-ACL, or 2) sector discards of a stock are less than 5% of total sector catch, but the fishery is catching less than 75% of the sub-ACL, the stocks could be considered for exclusion from not be used to predict the target ASM Coverage Level.

From FY 2012 – FY 2016, there were two years when the prioritization criteria would have reduced coverage: 2015 and 2016. The result of SNE/MA YT not being the driver of coverage levels for the sectors would be that GB Yellowtail Flounder would have been the driver of coverage levels (12.42%) in FY2015. Without factoring in the secondary discard threshold (set coverage level so that 80 percent of the discard estimates have CV30 at the sector/stock/gear level), this would result in an 8% reduction in coverage (12% rate for FY2015). In FY2016, application of the prioritization criteria would result in a coverage rate of 25.99% (GOM winter flounder), as redfish would not be the driver of coverage. While discards and catch of GOM winter flounder are within all of the proposed prioritization thresholds, the overfishing status of this stock is unknown, and therefore it would not meet the prioritization criteria based on its stock status.

Table 92 shows which stocks would have met the Council's proposed performance criteria using a range of PDT proposed thresholds. All stocks listed in the table were not overfished and overfishing was not occurring (at the time). The 50/5 criteria is the most rigorous, followed by a hybrid approach (50/10 or 75/5), and 75/10. In the one instance when performance criteria would have reduced coverage, the stock met the hybrid and the 75/10 threshold.

The performance criteria seek to balance the monitoring goals. In linking coverage rates to percentage of the ACL harvested or discarded, this alternative would create both an incentive to reduce discards, and potentially an incentive to cap landings of a stock a exceeding a threshold would lead to higher coverage in subsequent fishing years.

Under the prioritization approach, the FY 2016 total observer coverage target could be as low as 26%. The rate would scale down from the redfish rate to the GOM winter flounder rate. FY 2015 total coverage is 24%. As shown in Figure 21, a 41 percent coverage rate is estimated to be required 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (set coverage level so that 80 percent of the discard estimates have CV30 at the sector/stock/gear level); otherwise coverage would be 37%. Acadian redfish is the driver for this rate. Figure 21 indicates that at a CV30 that with a target coverage level of 26% that approximately 73% of discards would be observed, similarly at a CV20 that 53% of the discards would be observed. Sub-Option 5 would likely provide fewer positive benefits for regulated species that Option 1.

Impacts on other species

Information collected on other species would be collected at a lower total coverage rate than Option 1. Relative to Option 1/No Action, Sub-Option 5 would have a low negative impact on other species.

Table 91 - Performance criteria applied retrospectively, noting that the only prior year in which the performance criteria would have been met was for when determining the FY 2015 coverage rate.

Fishing Year	Data used to set Coverage			Application of Performance Criteria				Adjusted Rate	
	Stock driving coverage	Realized CV	Coverage Rate Needed CV30	Thresholds (Catch & Discards)			Criteria Met?	New Stock Driving Coverage	Coverage Rate Need CV30
				50/5	50/10 75/5	75/10			
2012	SNE/MA YT	13.95	10.44	n/a	n/a	n/a	No		
2013	GB winter	27.67	21.71	n/a	n/a	n/a	No		
2014	GB haddock	21.48	11.29	n/a	n/a	n/a	No		
2015	SNE/MA YT	31.37	20.63	No	Yes	Yes	Yes	GB YT	12.42
2016	Redfish	41.5	36.83	No	Yes	Yes	Yes	GOM WF	25.99

Table 92 - Stocks which would meet the performance criteria by FY (stock status, % of sector sub-ACL caught, and discards as % of catch)

Stock/FY	Threshold Options (% sub-ACL caught/discards as % catch)		
FY2016	**50/5**	**50/10 or 75/5**	**75/10 (*Council Preferred*)**
GB haddock	*No*	*Yes*	*Yes*
GOM haddock	*No*	*No*	*Yes*
Pollock	*Yes*	*Yes*	*Yes*
Redfish	*No*	*Yes*	*Yes*
White hake	*Yes*	*Yes*	*Yes*
FY2015	**50/5**	**50/10 or 75/5**	**75/10**
GB winter flounder	Yes	Yes	Yes
Pollock	Yes	Yes	Yes
Redfish	No	Yes	Yes
SNE/MA yellowtail flounder	No	Yes	Yes
FY2014	**50/5**	**50/10 or 75/5**	**75/10**
GB winter flounder	No	Yes	Yes
Pollock	No	Yes	Yes
Redfish	No	No	Yes
FY2013	**50/5**	**50/10 or 75/5**	**75/10**
GB haddock	No	Yes	Yes
GOM haddock	No	Yes	Yes
Pollock	No	Yes	Yes
Redfish	No	Yes	Yes
FY2012	**50/5**	**50/10 or 75/5**	**75/10**
GB haddock	Yes	Yes	Yes
GOM haddock	Yes	Yes	Yes
Redfish	No	Yes	Yes

Table 93 - Sector discards by stock and fishing year, including total discards by stock for FY2010-2014. Note that SNE/MA winter flounder was zero a possession stock for FY2010 – FY2012.

Sector Discards by Fishing Year (mt)						
Stock	FY2010	FY2011	FY2012	FY2013	FY2014	Total Discards
GB Cod	118	144.3	131.9	46.6	19.9	460.7
GOM Cod	79.9	145.5	122.1	19.7	24	391.2
GB Haddock	40.6	82	270.6	281.1	473.6	1147.9
GOM Haddock	2.7	7.4	33.3	20.8	29.9	94.1
GB YT	66.7	48.9	13	9.6	8.7	146.9
SNE/MA YT	4.6	18.7	41.8	10.9	3.1	79.1
CC/GOM YT	59.7	83.7	111.4	16.7	15.8	287.3
American Plaice	171.8	195.7	236.6	104.5	78.1	786.7
Witch Flounder	57.2	62	65.6	39.3	41.5	265.6
GB Winter Flounder	17.9	13.2	4.5	5.3	3	43.9
GOM Winter Flounder	1.6	5.1	8.5	4.5	4.9	24.6
SNE/MA Winter Flounder	34.3	83.5	104.2	6.8	3.1	231.9
Redfish	151.8	184.4	320	385.6	323.8	1365.6
White Hake	31.5	32.6	32.9	23.2	22.9	143.1
Pollock	78.3	109.4	98.2	105.4	133.6	524.9
GOM/GB Windowpane	151.4	156.2	129.5	237.3	157.4	831.8
SNE/MA Windowpane	52.6	82.8	95.8	86	68.2	385.4
Ocean Pout	56.4	56.3	35.4	27.3	30.8	206.2
Atlantic Halibut	19.5	31.1	45.2	40.4	26.6	162.8
Wolffish	18.7	32.2	30	17.1	14.3	112.3
Total Discards - All stocks (mt)	1215.2	1575	1930.5	1488.1	1483.2	7692
Total Discards - Allocated Stocks (mt)	882.3	1132.9	1490.4	1080	1185.9	5771.5

Table 94 - Stock specific discards as a proportion of total groundfish discards by stock and fishing year. Note that discard values for SNE/MA winter flounder for FY2010 - FY2012 are not presented because the possession the stock was prohibited during this time.

Discards lbs by stock as a percentage of GF discards for allocated stocks only						
Stock	FY2010	FY2011	FY2012	FY2013	FY2014	Total Discards
GB Cod	13.4%	12.7%	8.8%	4.3%	1.7%	8.0%
GOM Cod	9.1%	12.8%	8.2%	1.8%	2.0%	6.8%
GB Haddock	4.6%	7.2%	18.2%	26.0%	39.9%	19.9%
GOM Haddock	0.3%	0.7%	2.2%	1.9%	2.5%	1.6%
GB YT	7.6%	4.3%	0.9%	0.9%	0.7%	2.5%
SNE/MA YT	0.5%	1.7%	2.8%	1.0%	0.3%	1.4%
CC/GOM YT	6.8%	7.4%	7.5%	1.5%	1.3%	5.0%
American Plaice	19.5%	17.3%	15.9%	9.7%	6.6%	13.6%
Witch Flounder	6.5%	5.5%	4.4%	3.6%	3.5%	4.6%
GB Winter Flounder	2.0%	1.2%	0.3%	0.5%	0.3%	0.8%
GOM Winter Flounder	0.2%	0.5%	0.6%	0.4%	0.4%	0.4%
SNE/MA Winter Flounder	NA	NA	NA	0.6%	0.3%	0.2%
Redfish	17.2%	16.3%	21.5%	35.7%	27.3%	23.7%
White Hake	3.6%	2.9%	2.2%	2.1%	1.9%	2.5%
Pollock	8.9%	9.7%	6.6%	9.8%	11.3%	9.1%

Figure 28 - Sector catch as a percentage of the sub-ACL, and sector discards as a percentage of catch for FY 2010 - FY 2014.

	Stock	Sector Catch as % of sub-ACL					Discards as % of Catch				
		FY2010	FY2011	FY2012	FY2013	FY2014	FY2010	FY2011	FY2012	FY2013	FY2014
Allocated	GB Cod	83%	76%	35%	87%	79%	4%	4%	8%	3%	1%
	GOM Cod	84%	93%	60%	90%	80%	2%	3%	6%	3%	4%
	GB Haddock	21%	13%	4%	11%	32%	0%	2%	23%	9%	9%
	GOM Haddock	46%	69%	38%	91%	75%	1%	2%	14%	12%	9%
	GB Yellowtail	92%	88%	59%	37%	25%	9%	5%	6%	17%	14%
	SNE/MA Yellowtail	65%	90%	70%	58%	68%	3%	5%	10%	4%	1%
	CC/GOM Yellowtail	77%	87%	93%	81%	54%	11%	11%	12%	4%	6%
	American Plaice	55%	54%	50%	100%	95%	11%	12%	15%	8%	6%
	Witch Flounder	84%	82%	69%	107%	86%	8%	6%	7%	6%	8%
	GB Winter Flounder	76%	97%	57%	49%	34%	1%	1%	0%	0%	0%
	GOM Winter Flounder	61%	51%	37%	24%	18%	2%	3%	3%	3%	4%
	SNE/MA Winter Flounder	NA	NA	NA	62%	46%	81%	96%	99%	1%	1%
	Redfish	32%	36%	53%	40%	45%	7%	7%	7%	10%	7%
	White Hake	88%	102%	75%	53%	41%	1%	1%	1%	1%	1%
	Pollock	34%	54%	51%	38%	30%	1%	1%	2%	2%	3%
Non-Allocated	GOM/GB Windowpane	138%	142%	100%	242%	161%	100%	100%	100%	100%	100%
	SNE/MA Windowpane	34%	54%	133%	84%	67%	100%	100%	100%	100%	100%
	Ocean Pout	24%	24%	17%	14%	16%	100%	100%	100%	100%	100%
	Atlantic Halibut	85%	125%	159%	103%	81%	76%	75%	79%	75%	58%
	Wolffish	26%	44%	41%	28%	23%	99%	100%	100%	100%	100%

Combination of Options

The Council's Preferred Alternative is Option 2, 3A, 3B, 4A and 5 (75/10). The Council clarified that Option 4B could be done through the sector exemption process if Option 4A was approved. Relative to the No Action/Option 1, the combination of these options results in a reduction in the overall observer coverage rate over the current approach for FY2016. For FY 2016, the No Action would result in a total observer coverage rate of 41% while the combination of these options would result in a total coverage rate of 14% for the portion of sector vessels not fishing under the ELM exemption (i.e., the redfish rate needed to achieve a CV30 of 37% total observer coverage rate scaled back to the SNE/MA yellowtail flounder rate at 14%). Table 95 describes the overall observer coverage which would result from the cumulative combination of each of the Council's preferred alternatives.

An overall coverage rate of 14% is expected to be sufficient to meet the goals and objectives of the groundfish monitoring program. When examining the past five years (FY2010– FY2014) of discards estimates, coverage levels of 14% would have achieved a CV30 or better for 95 out of the 100 monitored stocks (i.e., 20 stocks x 5 years). For two of the years, (FY2010 and FY2012), all of the stocks would have achieved a CV30 or better. The lowest CV30 achievement overall would have occurred in FY 2014, when 17 of the 20 groundfish stocks would have met the CV30 under the 2016 target coverage level of 14%. The three stocks that would not have achieved the CV30 include redfish, GOM winter flounder, and SNE/ MA yellowtail flounder. The only stock that would not have achieved a CV30 for more than one of the five years (2 times) was SNE/MA yellowtail flounder. However, the proposed 14%coverage rate is projected to achieve the necessary CV30 requirement for SNE/MA yellowtail flounder in FY2016. Further, the risk of not achieving the required CV level for these stocks is mitigated by a number of factors. For example, for SNE/MA yellowtail flounder, a more sizeable portion of its ACL has been caught over the last three years (58–70%), but less than 10% of total catch was made up of discards. Redfish and GOM winter flounder were underutilized over the last three fishing years (less than 50% of the ACL caught) and less than 10% of their total catch was made up of discards. Thus, even in the unexpected event of not achieving a CV30, the risk to these stocks of erring in the discard estimates is very low.

The combination of options may mitigate some of the negative economic impacts of monitoring requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to maintaining the ASM program as-is (No Action alternative). The combination of options is expected to have low negative impacts on regulated groundfish species when compared to Option 1/No Action.

Table 95 - Council's Preferred ASM Alternatives and Resulting FY 2016 ASM Coverage Levels

Alternative	No Action and Council's Preferred Alternatives	Total 2016 coverage level (NEFOP + ASM)(%)	Driving Stock
4.3.1.1	No Action	41%	Redfish
4.3.1.3.1	Clarify that coverage levels be set only using realized stock level CVs (Preferred Alternative)	37%	Redfish
4.3.1.4.1	Remove ASM coverage requirement for extra-large mesh gillnet trips (Preferred Alternative)	37%	Redfish
4.3.1.3.2	Multi-year approach to setting sector coverage (Preferred Alternative)	17%	Redfish
4.3.1.5	Fishery Performance Criteria for Predicting the target ASM coverage level (Preferred Alternative)	14%	SNE/MA yellowtail flounder

Table 96 - Realized stock CVs and percent coverage required to achieve CV30, FY 2012 - FY 2014 removing the existing SNE ELM exemption and proposed ELM gillnet exemption in FW 55. Source: GARFO, January 6, 2016. The final column summarizes the three year average (multi-year) approach by stock.

STOCK	FY2012		FY2013		FY2014		Average- three year approach
	CV	Percent Coverage	CV	Percent Coverage	CV	Percent Coverage	Percent Coverage
GB Cod East	20.44	10.05	48.86	28.08	24.6	14.36	17.5
GB Cod West	12.26	4.07	15.43	6.15	17.11	9.63	6.62
GB Cod	10.55	3.03	14.8	5.49	14.65	7.06	5.19
GOM Cod	9.89	3.05	6.07	1.11	11.16	5.02	3.06
Plaice	5.52	0.82	6.51	1.07	7.35	1.84	1.24
GB Winter Flounder	21.3	8.87	23.02	10.63	20.79	11.19	10.23
GOM Winter Flounder	8.96	2.54	15.1	6.4	29.06	25.99	11.64
Witch Flounder	8.74	2.04	7.41	1.35	8.96	2.55	1.98
CC/GOM Yellowtail Flounder	7.8	1.83	9.31	2.43	14.1	7.33	3.86
GB Yellowtail Flounder	15.98	5.11	24.84	12.42	21.16	11.59	9.71
SNE/MA Yellowtail Flounder	12.91	4.23	31.45	21.75	23.2	16.84	14.27
GB Haddock East	35.04	24.77	30.17	13.01	10.64	3.27	13.68
GB Haddock West	27.08	17.19	13	4.46	9.95	3.51	8.39
GB Haddock	21.77	11.78	11.95	3.66	8.44	2.47	5.97
GOM Haddock	12.27	4.61	12.98	4.84	12.03	5.76	5.07
White Hake	13.1	4.47	11.81	3.38	15.36	7.6	5.15
Pollock	7.72	1.63	7.55	1.4	9.71	3.19	2.07
Redfish	13.85	4.91	21.23	9.94	41.69	37.04	17.3
SNE/MA Winter Flounder	15.44	7.02	21.21	12.82	16.69	10.61	10.15
Southern Windowpane	10.7	2.99	7.98	1.81	8.26	2.54	2.45
Northern Windowpane	11.01	3.22	16.69	6.35	12.76	5.16	4.91
Ocean Pout	11.7	3.57	11.57	2.8	16.5	7.76	4.71
Halibut	6.7	1.22	7.53	1.39	6.67	1.56	1.39
Wolffish	8.35	1.9	9.58	2.2	9.75	3.19	2.43

7.1.3.2 Management Measures for U.S. Georges Bank Cod TACs

7.1.3.2.1 Option 1: No Action

Impacts on regulated groundfish

Option 1/No Action maintains current separations between Eastern and Western Georges Bank cod allocations. Option 1/No Action option is not expected to impact regulated groundfish species, since the distribution of U.S. TACs for Eastern/Western Georges Bank cod would remain unchanged.

Impacts on other species

This option would not be expected to have any direct or indirect impacts on other species. This option would not be expected to lead to any changes in catches of other species, since the distribution of U.S. TACs for Eastern/Western Georges Bank cod would remain unchanged.

7.1.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod (*Preferred Alternative*)

Impacts on regulated groundfish

Option 2 would allow some eastern GB allocations to be converted irreversibly to western GB allocation and harvested within the western GB area within a fishing year. Western GB cod could not be converted to eastern GB cod. The purpose is to create flexibility while preventing overharvest of eastern GB cod which is a transboundary resource. An identical provision is currently in place for GB haddock. This measure could allow more of the GB cod stock to be harvested by creating opportunities for vessels that do not typically fish on eastern GB to convert their allocations of eastern GB cod to western GB cod, and then harvest it in the western GB stock area. This could increase fishing effort on Georges Bank slightly. If there is a shift in the fishery to the western GB area, then fishery size selectivity of GB cod may change. However, given that the ACL for GB cod is fairly small compared to recent years (Table 115), large increases in effort and major changes in fishery size selectivity are not expected under this alternative. Thus, biological impacts on regulated groundfish species are expected to be neutral relative to Option 1.

Impacts on other species

This option would not be expected to have any direct or indirect impacts on other species. This option would not be expected to lead to any changes in catches of other species, and would not affect the management of those species.

7.1.3.3 Modification to the Gulf of Maine Cod Protection Measures

7.1.3.3.1 Option 1: No Action

Impacts on regulated groundfish

Option 1/No Action would continue the zero possession limit for this stock, which was implemented via Framework 53 as a Gulf of Maine Cod Protection Measure. Option 1/No Action would continue to provide positive impacts for GOM cod. Results from the bioeconomic model for GOM recreational fisheries indicate that recreational mortality for GOM cod is predicted to be less than the recreational sub-ACL for FY 2016 under no possession of GOM cod (Table 121). The mortality of GOM cod depends on

NMFS adjustments to the GOM haddock measures (bag limit, size limit, and season) in FY 2016, with increasing access to GOM haddock (405 mt to 715 mt) and predicted increase in effort aligned with increasing mortality on GOM cod (66 mt to 97 mt). The GOM cod sub-ACL is 157 mt and GOM haddock sub-ACL is 928 mt and under Option 1/No Action, the recreational fishery is not predicted to exceed either of the sub-ACLs.

Impacts on other species

Option 1/No Action would not be expected to have any direct or indirect impacts on other species. This option would not be expected to lead to any changes in catches of other species co-caught with groundfish species, and would not affect the management of those species. In general, this option would not be expected to have direct or indirect impacts on other species caught on recreational fishing such as monkfish, skates, and spiny dogfish are not likely to be affected.

7.1.3.3.2 Option 2: Change in Authority to Modify GOM Cod Recreational Possession Limits (*Preferred Alternative*)

Option 2 would return to prior policy which allowed the Regional Administrator to modify the possession limit for GOM cod. This change is considered to be largely administrative, as the provisions of the GOM cod protection measures would still be considered when the Regional Administrator sets the bag limit, size limit, and seasons for GOM cod, which may include keeping the GOM cod possession limit at zero. Therefore, Option 2 would provide neutral to low negative impacts on GOM cod, when compared to Option 1/No Action.

Results from the bioeconomic model indicate that for all options, GOM haddock mortality is predicted to remain under the recreational sub-ACL (928 mt) 100% of the time (Table 121). The likelihood of GOM cod mortality remaining below the recreational sub-ACL decreases with bag limit increases when the open season occurs during Wave 3 (March-April) compared to Wave 4 (July and August) or Wave 5 (September-October), all else held equal. Wave 5 open is predicted to have lower GOM cod mortality than Wave 4 open. A change in the cod size limit from 24” to 23” also causes a sizable decrease in the probability of remaining below the sub-ACL. For viable options, GOM cod mortality ranges from 66 mt to 134 mt, with the recreational sub-ACL at 157 mt.

Closures for the commercial fishery under the GOM cod protection measures for sectors occurs in specific 30-minute blocks in May, June, and November – January and for the common pool additional closures in March and October. The commercial closures were designed to protect spawning cod and reduce mortality on cod in certain times and areas. GOM cod protection measures – as time-area closures – are not in place in February, April, July, August, and September. These months correspond to the second half of wave 2 (February), the second half of wave 3 (April), wave 4 (July and August) and first part of wave 5 (September).

Impacts on other species

Option 1/No Action would not be expected to have any direct or indirect impacts on other species. This option would not be expected to lead to any changes in catches of other species co-caught with groundfish species, and would not affect the management of those species. In general, this option would not be expected to have direct or indirect impacts on other species caught by recreational fishing such as monkfish, skates, and spiny dogfish.

7.2 Essential Fish Habitat Impacts

The Essential Fish Habitat (EFH) impacts discussions below focus on changes in the amount or location of fishing that might occur as a result of the implementation of 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 alternatives includes 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; Atlantic Mackerel, Squid, and Butterfish; Spiny Dogfish; Tilefish; Deep-Sea Red Crab; Atlantic Surfclam and Ocean Quahog; Atlantic Bluefish; Northeast Skates; and Atlantic Highly Migratory Species.

7.2.1 Updates to Status Determination Criteria and Annual Catch Limits

7.2.1.1 Revised Status Determination Criteria

7.2.1.1.1 Option 1: No Action

Under Option 1/No Action there would be no changes to status determination criteria for groundfish stocks, or the resulting numerical estimates derived from these criteria. 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. This could lead to reduced CPUE and a resulting increase in seabed area swept, particularly when compared to Option 2. However, many factors interact to produce the amount and location of seabed area swept in a particular fishery, such that the effect of SDC on the amount of habitat impacts is uncertain at best.

7.2.1.1.2 Option 2: Revised Status Determination Criteria (*Preferred Alternative*)

Under Option 2, status determination criteria (SDC) for most stocks would remain unchanged, and the numerical estimates would be updated for informational purposes to reflect assessment updates completed during 2015. 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 should lead to increased catch per unit effort (CPUE), and therefore reduce seabed area swept. However, many factors interact to produce the amount and location of seabed area swept in a particular fishery, such that the effect of changing SDC on the amount of habitat impacts is uncertain at best. In this specific case, the unknown overfishing status of GB cod and halibut may or may not lead to increased precaution in setting catch limits for these stocks, so long-term conservation benefits are difficult to determine.

7.2.1.2 Annual Catch Limits

7.2.1.2.1 Option 1: No Action

Under Option 1/No Action, the ACLs specified for FY 2016 would be unchanged from those adopted through FW 53 (Table 7). Default specifications, set at 35% of the FY2015 catch limits, would be put in place for all other stocks and expire on July 31st, 2016 or when replaced by new specifications (Table 6 and Table 7). Default specifications were adopted through FW53 with the intent of allowing the fishing year to begin on time in the event of a delay in rulemaking. Under Option 1, the directed groundfish fishery would be expected to operate in all broad stock areas through July. If Option 1 is selected there would be no quotas specified for transboundary stocks (GB YTF, cod, and haddock) including no scallop or small-mesh fishery sub-ACLs for GB YTF. In addition, no scallop fishery sub-ACL for SNE/MA yellowtail flounder would be specified.

After July 31st, the following allocated stocks would not have ACLs specified: GB cod, GB haddock, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, American plaice, witch flounder, SNE/MA winter flounder, and redfish. Pollock, redfish, American plaice, and witch flounder are unit stocks – meaning that their stock area includes the GOM, GB, and SNE/MA. In the absence of stock specific specifications, commercial groundfish vessels would be unable to fish in the respective broad stock areas without an allocation.

It is anticipated that Option 1 would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31st, Option 1 would be expected to reduce commercial groundfish fishing effort in the GOM, GB, and SNE/MA. In addition, certain provisions of the sector management system make it likely that fishing activity could be constrained even for stocks with an ACL. Current management measures require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on stocks for which the sector continues to have ACE only if the sector can demonstrate it would not catch the ACE-limited stock. What these provisions mean is that in most cases there would be little opportunity for sector vessels to fish on stocks that have an ACL under no action, most groundfish fishing activity would not occur. As a result, in general this option would be expected to result in dramatically lower fishing mortality and dramatically lower impacts to EFH and benthic habitats as compared to the alternative specifications (Option 2, see QCM B in Table 109). The default specifications would continue to allow fishing for the first three months of the fishing year, but after that effort and habitat impacts would decline.

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

During the development of FW55, the Council considered multiple ABCs for witch flounder, along with separate SNE/MA yellowtail flounder sub-ACL values for the scallop fishery (Table 9). The Council considered two SNE/MA sub-ACLs for the scallop fishery (Table 115), one based on 90% of estimated catch (sub-Option 1A), and the other based on 100% (sub-Option 1B) of estimated catch. The difference between these sub-ACLs is likely to be negligible (32mt vs. 36mt) with respect to EFH impacts. Scallop fishery catches of SNE/MA yellowtail flounder were greater than options proposed in both sub-options in FY 2013 and FY 2014 (Table 97).

Table 97 - FY 2013 and FY 2014 year end scallop fishery catch of GF species with sub-ACL allocations (mt)

SNE/MA Yellowtail Flounder	Total ACL	Sub-ACL to Scallop fishery	Catch of GF by scallop fishery	Percent of sub-ACL used	Percent of total ACL used by scallop fishery
2013	665	43.6	48.6	111.5%	7.3%
2014	665	66	64.8	98.2%	9.7%

With regard to witch flounder, the Council considered a range of witch flounder ABC's between 399 mt and 500 mt. Table 10 describes the corresponding range of sector level sub-ACLs. As catch limits can be considered a proxy for relative fishing effort, results from the quota change model (see Section 7.4) can be used to discern potential impacts between witch flounder sub-options for ecosystem components that consider the impacts of fishing effort and gear, such as EFH. Results of the QCM suggest that overall fishing effort would be constrained by GOM cod and GB cod quotas, not any of the witch flounder ABCs considered by the Council. As such, the overall impacts of each of the witch flounder sub-options is likely to be similar with respect to each other, and negative when considered in the context of FW53 sub-ACLs (Table 107). Due to the similarities in impacts between sub-options A and B, the impacts for Option 2 focus on the comparisons between No Action and Option 2 with the Council's preferred sub-options.

- *Option 2 – Preferred Alternative, including:*
    - *Sub-Option 1A – SNE/MA Yellowtail Flounder Scallop sub-ACL at 90% of Estimated Scallop Fishery Catch (Preferred Sub-Option)*
    - *Sub-Option 2B –Witch Flounder ABC of 460 mt (Preferred Sub-Option)*

Under Option 2 and the preferred sub-options, updated specifications for all stocks would be adopted for fishing years 2016, 2017, and 2018. Values for transboundary stocks would be subject to adjustment in 2017 and 2018 (as written, Table 10 shows the total ABC and ACL values for these years, without a deduction for the Canadian fishery). The witch flounder ABC would be set at 460 mt. A scallop fishery sub-ACL for SNE/MA yellowtail flounder would be specified at 90% of the scallop fishery catch, as estimated by the Scallop PDT. Most stocks show an increase in their ACLs under Option 2 when compared to No Action. In particular, the GB haddock ACL is substantially higher under this option (new ACL, 53,309 mt is over six times higher than the default ACL, 8,121 mt), and the GOM haddock ACL is approximately double under Option 2 (3,430 mt vs. 1,675 mt). The Option 2 redfish and pollock specifications are also much larger; 9,837 mt vs. 3,988 mt for redfish and 20,374 mt vs. 15,878 mt for pollock. Thus, relative to No Action/Option 1 specifications, fishing effort and therefore associated fishery impact to EFH may increase slightly due to the higher ACLs. Net habitat impacts are difficult to estimate, but may be slightly negative relative to No Action.

Relative to FY 2015 specifications (which are different from Option 1/No Action, see Framework 53), Option 2 would increase FY 2016 ACLs for GB and GOM haddock, GOM cod, GOM winter flounder, pollock, halibut, wolffish, and southern windowpane flounder. There would be several important decreases in FY 2016 ACLs, specifically witch flounder, SNE/MA yellowtail flounder, GB winter flounder, and GB cod. While there would be a small uptick in the GOM cod ACL, the status of the stock is poor and quotas remain near all-time lows. Under Option 2, the declining ACLs for several stocks are likely to constrain the directed fishery, and may significantly reduce fishing effort in all broad stock areas relative to fishing effort in FY 2015. Results from QCM F (see Table 100 and Table 101) indicate that overall fishing effort will be constrained by low GOM and GB cod quotas, such that utilization of other stocks will remain consistent or below catch levels in recent years. Therefore, fishing effort would be expected to curtail fishing effort, thus, Option 2 is likely to have positive impacts to EFH relative to the status quo.

7.2.2 Fishery Program Administration

7.2.2.1 Implementation of an Additional Sector

7.2.2.1.1 Option 1: No Action

Under Option 1/No Action the existing list of 24 sectors would be maintained as-is. Maintaining the current fleet organization in terms of the number of authorized sectors is not expected to have direct impacts, positive or negative, on EFH as overall fishing effort is constrained by the ACL.

7.2.2.1.2 Option 2: Implement a New Sector for FY 2016 (*Preferred Alternative*)

Under Option 2, the Sustainable Harvest Sector II would be allowed to operated beginning May 1, 2016. Changes to the fleet's organization in terms of the number of authorized sectors is not expected to have direct impacts, positive or negative, on EFH as overall fishing effort is constrained by the ACL.

7.2.2.2 Sector Approval Process

7.2.2.2.1 Option 1: No Action

Under Option 1/No Action the Amendment 16 procedures for approving a sector would be maintained. The sector approval process is administrative and is not related to fishing effort, or the fishery's impact on EFH, so there would be no habitat impacts positive or negative associated with this alternative.

7.2.2.2.2 Option 2: Revised Process for Approving New Northeast Groundfish Sectors (*Preferred Alternative*)

Under Option 2, the process would be revised to still allow for Council input to the process, but sector approvals would no longer be considered as part of a Council management action. NMFS would only approve sectors if recommended by the Council. This change adds flexibility to the sector approval process. As above, because the sector approval process is administrative and is not related to fishing effort or the fishery's impact on EFH, there are no habitat impacts, positive or negative, associated with changes to the procedure for approving new sectors.

7.2.2.3 Modification to the Definition of the Haddock Separator Trawl

7.2.2.3.1 Option 1: No Action

Under Option 1/No Action the current regulatory definition of this gear would be maintained (see 50 CFR 648.85(a)(3)(iii)(A)). Because there are no particular habitat conservation implications associated with the haddock separator trawl, there are no habitat impacts, positive or negative, associated with the gear definition.

7.2.2.3.2 Option 2: Revised Definition of the Haddock Separator Trawl (*Preferred Alternative*)

Under Option 2, the middle, separator panel would be required to be a contrasting color, so that it can be more readily identified by enforcement officers. This alternative has neutral impacts on EFH relative to No Action, because the change does not have any effect on the way the gear fishes that would influence the degree of bottom contact, swept area, or efficiency.

7.2.3 Commercial and Recreational Fishery Measures

7.2.3.1 Groundfish Sector Monitoring Program

In this section, the Council may combine the various action alternatives (Options 2, 3A/B, 4A/B, and 5). The action alternatives in general are intended to maintain monitoring coverage levels needed to estimate catches of groundfish stocks, and reduce or eliminate monitoring in areas where it is not needed to manage costs. Thus, the action alternatives in combination may lead to increases in fishing effort where it otherwise would have been constrained due to costs associated with the sector monitoring program. Increased cost sharing is forthcoming under any of these alternatives, which could lead to reduced fishing effort. However, it is difficult to predict how the industry will operate under Option 1, in terms of whether it will constrain effort, let alone under the other options in this section.

7.2.3.1.1 Option 1: No Action

Option 1/No Action would maintain the existing monitoring program as defined in Amendment 16 and Framework 48. The cost sharing envisioned under Amendment 16, which is just now being implemented, combined with no other changes to the goals or requirements of the program, could lead to reduced fishing effort under No Action as compared to current conditions, and therefore to reductions in gear impacts on EFH. It is difficult to predict the magnitude of these changes, and the gear types and locations that would see more or less fishing activity during the coming fishing years.

7.2.3.1.2 Option 2: Clarify Groundfish Monitoring Goals and Objectives (*Preferred Alternative*)

Option 2 would clarify that the primary goal of the sector monitoring program is to verify area fished, catch, and discards by species and gear type, and that this goal should be met via the most cost effective means practicable. This clarification may help to limit coverage levels to instances where it is necessary to achieve these objectives, therefore reducing cost burdens associated with monitoring. As this option represents a change to the goals of the program only, it will have an indirect impact on coverage levels and distribution of covered trips. No direct impacts to EFH are expected.

7.2.3.1.3 Option 3: Clarify methods used to set sector coverage rates (*Preferred Alternative*)

- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)
- Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

These sub-options would refine the approaches used to set coverage rates and should help to make these rates more stable over time and across sectors. Results of the QCM (Table 105) suggests that the number of trips and days absent from the fishery are not expected to change in any appreciable way when compared to recent fishing activity (FW53 vs. FW55). When compared to the No Action alternative, no direct impacts to EFH are expected.

7.2.3.1.4 Option 4: Remove ASM coverage requirements for a sub-set of sector gillnet trips

- Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear (*Preferred Alternative*)
- Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries

Under Sub-Option 4A, ASM coverage would not be required for sector vessels that declare a gillnet trips in BSAs 2 and 4 when fishing ELM of 10" or greater. Sub-Option 4B is similar, except that it applies to sector vessels fishing with gillnets in the Cape Cod Spiny Dogfish Exemption Area and SNE Dogfish Gillnet Fishery Exemption Area. On both types of trips, groundfish catches are low. These options, singly or in combination, could help to maintain the amount of fishing on these types of trips at status quo levels, limiting any dampening effect ASM requirements have on these fisheries. However, gillnet gear generally has minimal and temporary impacts on EFH, such that implementing either or both of these options is expected to have neutral impacts on habitat relative to No Action.

7.2.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

Option 5 would set specific criteria under which certain stocks would not be predictors for the annual ASM coverage level. The criteria are related to stock condition (exceeding reference points), low discards (5-10% of catch), and moderate percentage of the ACL harvested (50-75%). The Council's preferred alternative set the criteria to be low discards (less than 10% of catch) and moderate percentage of the ACL harvested (less than 75%). In practice, other stocks not meeting these criteria might be the primary determinants of coverage levels. No direct impacts to EFH are expected.

Combination of Options

The Council's Preferred Alternative for sector monitoring combines Option 2, 3A, 3B, 4A and 5 (75/10). The Council clarified that Option 4B could be done through the sector exemption process if Option 4A was approved. Relative to the No Action/Option 1, the combination of these options results in a reduction in the overall observer coverage rate over the current approach. For FY 2016, the No Action would result in a total observer coverage rate of 41% while the combination of these options would result in a total coverage rate of 14% for the portion of sector vessels not fishing under the ELM exemption. Gillnet gear generally has minimal and temporary impacts on EFH, such that implementing either or both of these options is expected to have neutral impacts on habitat relative to No Action. The combination of options may mitigate some of the negative impacts of monitoring requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to the No Action alternative. No direct impacts to EFH are expected.

7.2.3.2 Management Measures for U.S. Georges Bank Cod TACs

7.2.3.2.1 Option 1: No Action

Option 1/No Action maintains current separations between eastern and western Georges Bank cod allocations. Under this option, neutral impacts to EFH area expected as current spatial patterns of groundfishing would be generally maintained.

7.2.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod (*Preferred Alternative*)

Option 2 would allow some eastern GB allocations to be converted irreversibly to western GB allocation and harvested within the western GB area. Both the conversion and the harvest would need to occur within a single fishing year. Western GB cod could not be converted to eastern GB cod. The purpose is to create flexibility while preventing overharvest of eastern GB cod which is a transboundary resource. An identical provision is currently in place for GB haddock. This measure could allow more of the GB cod stock to be harvested by creating opportunities for vessels that do not typically fish on eastern GB to convert their allocations of eastern GB cod to western GB cod, and then harvest it in the western GB stock area. This could increase fishing effort on Georges Bank slightly. However, given that the ACL for GB cod is fairly small, large increases in effort are not expected under this alternative. Thus, habitat impacts are expected to be neutral to slightly negative relative to Option 1.

7.2.3.3 Modification to the Gulf of Maine Cod Protection Measures

7.2.3.3.1 Option 1: No Action

Option 1/No Action would continue the zero possession limit for this stock, which was implemented via Framework 53 as a Cod Protection Measure. As recreational hook and line gears do not have adverse impacts on fish habitat, maintaining the current zero possession limits for the recreational fishery has no effect positive or negative on habitat impacts in the groundfish fishery.

7.2.3.3.2 Option 2: Change in Authority to Modify GOM Cod Recreational Possession Limits (*Preferred Alternative*)

Option 2 would return to prior policy which allowed the Regional Administrator to modify the possession limit for GOM cod. Impacts are the same as for Option 1, as recreational hook and line gears do not have adverse impacts on fish habitat and changing the possession limits for the recreational fishery has no effect positive or negative on habitat impacts in the groundfish fishery.

7.3 Impacts on Endangered and Other Protected Species

The FW 55 alternatives are evaluated for their impacts on species protected under the Endangered Species Act of 1973 (ESA) and/or the Marine Mammal Protection Act of 1972 (MMPA). Section of 6.5.1 of the Affected Environment Section contains a complete list of protected species (i.e., ESA and non-ESA listed species) that inhabit the areas of operation for the Northeast multispecies fishery (Table 18). This impact analysis considers how the fishery may overlap with protected species in time and space, as well as records of protected species interaction with particular gear types (e.g. gillnet, hook, and mobile gear).

7.3.1 Updates to Status Determination Criteria and Annual Catch Limits

7.3.1.1 Revised Status Determination Criteria

Updating the SDC is an administrative measure, and will not have a direct impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior. Whatever impact indirectly precipitates from changes to SDC or mortality targets will be discussed in the context of other alternatives – including ACLs – that the Council adopts in order to meet mortality targets derived from the new SDC and control rules. For clarification, Option 2 would reflect the most recent 2015 operational assessments and would be based on the best available science, consistent with the M-S Act.

7.3.1.2 Annual Catch Limits

7.3.1.2.1 Option 1: No Action

Under Option 1, the ACLs specified for FY 2016 would be unchanged from those adopted through FW 53. Default specifications, set at 35% of the FY2015 catch limits, would be put in place for all other stocks and expire on July 31st, 2016 or when replaced by new specifications. Default specifications were adopted through FW53 with the intent of allowing the fishing year to begin on time in the event of a delay in rulemaking. Under Option 1, the directed groundfish fishery would be expected to operate in all broad stock areas through July. After July 31st, the following allocated stocks would not have ACLs specified: GB cod, GB haddock, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, American plaice, witch flounder, SNE/MA winter flounder, and redfish. Pollock, redfish, American plaice, and witch flounder are unit stocks – meaning that their stock area includes the GOM, GB, and SNE/MA. In the absence of stock specific specifications, commercial groundfish vessels would be unable to fish in the respective broad stock areas without an allocation.

Based on the above information, it is anticipated that Option 1 would result in minimal changes in groundfish fishing effort during the first three months of the fishing year. After July 31st, Option 1 would be expected to reduce commercial groundfish fishing effort in the GOM, GB, and SNE/MA stock areas, thereby reducing the amount of trawl or gillnet gear in the water. As interaction risks with protected species are strongly associated with amount and time that gear is in the water, any reduction in gillnet and trawl gear has the potential to reduce interaction risks, and thus incidences of serious injury or mortality, in these broad stock areas. As a result, low positive impacts to protected species are likely to be experienced under these conditions.

Although the latter provides some positive impacts to protected species, protected species may still experience low negative impacts from the operation of other non-groundfish fisheries that can continue to fish in these broad stock areas should new groundfish specifications not be in place by July 31st. Other fisheries with incidental catch of groundfish would continue to operate past July 31st in the GOM, GB, and SNE/MA, which may result in an increase in effort in these fisheries. Although these other fisheries have the potential to take advantage of the reduction in groundfish fishing effort after July 31st, any potential increase in effort would be constrained with incidental catch limits and quota allocations in these other fisheries. As a result, significant increases and shifts in overall fishing effort to levels above and beyond what has been experienced in these broad stock areas to date are not expected and therefore, interaction risks to protected species in these broad stock areas are not expected to change significantly from what has been observed to date in these regions. Specifically, as fishing behavior and effort are not expected to change significantly from status quo conditions, the presence, quantity, or degree of gillnet, bottom trawl or other gear types used in these areas are also not expected to change significantly. Therefore, continuation of these non-groundfish fishing operations are not expected to introduce any new interaction risks to protected species that would result in elevated levels of interactions above and beyond that which has been observed and considered by NMFS to date (Waring *et al*. 2014; Waring *et al*. 2015; NMFS 2002; NMFS 2012; NMFS 2013; NMFS; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; www.nefsc.noaa.gov/fsb/take_reports/asm.html). For instance, as provided in Waring *et al*. (2014, 2015), aside from several large whale species (e.g., North Atlantic right, humpback, and fin), harbor porpoise, and several stocks of bottlenose dolphin, there has been no indication that takes of marine mammals in commercial fisheries has exceeded PBR thresholds, and therefore, gone above and beyond levels which would result in the inability of each species population to sustain itself (Waring *et al*. 2014, 2015). Although several species of large whales, harbor porpoise and several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR threshold, take reduction plans have been implemented to reduce bycatch in the fisheries affecting these species (i.e., Atlantic Large Whale Take Reduction Plan, Harbor Porpoise Take Reduction Plan, and the Bottlenose Dolphin Take Reduction Plan see Section 1.1 for details). These plans are still in place and are continuing to assist in decreasing bycatch levels for these species and in fact, co-occur with the closed areas in the Western GOM. Although the information presented in Waring *et al*. (2014, 2015) is a collective representation of commercial fishery interactions with marine mammals, and does not address the effects of any FMP specifically, the information does demonstrate that fishery operations over last 5 or more years have not resulted in a collective level of take that threatens the continued existence of marine mammal populations (aside from those species noted above).

In conjunction with the above, additional analysis on the impacts of the operation of fisheries in the northeast region have also been conducted by NMFS, pursuant to section 7 of the ESA, for ESA-listed species of sea turtles, fish, and whales. In Biological Opinions issued for specific FMPs in 2002, 2012(a), 2013, and 2014, NMFS concluded that the operation of these FMPs in the region, may affect, but will not jeopardize the continued existence of any ESA listed species (i.e., sea turtle species, Atlantic sturgeon, Atlantic salmon, large whale species). Since issuance of these Opinions, there has been no indication that these fisheries have changed in any significant manner such that the level of ESA listed species interactions has gone above and beyond those considered by NMFS in its assessment of fisheries affects to listed species (if they had, NMFS would have re-reinitiated the Opinions). As fishing effort in non-groundfish fisheries are not expected to significantly change from current operating conditions, interactions with ESA listed species that are above and beyond levels previously considered by NMFS are not expected. As a result, we do not expect impacts to ESA-listed species to be different from those already considered by NMFS (NMFS 2002; NMFS 2012; NMFS 2013; NMFS 2014) and therefore, we do not, as concluded by NMFS, expect continued operation of non-groundfish fisheries to result in interactions levels that would jeopardize the continued existence of any ESA listed species.

<u>Based on the above information, and the fact that all fisheries must comply with existing ALWTRP, HPTRP, and BDTRP regulations, we expect impacts to protected species (MMPA protected and ESA listed species) from Option 1 to be low positive to low negative).</u> Relative to Option 2, Option 1, will afford more positive impacts to protected species as lower Annual Catch Limits and the potential for the groundfish fishery to be halted after July 31 will likely decrease overall effort in the BSAs and therefore, reduce the potential for interactions with protected species. These positive impacts would be removed

under Option 2 which would set allocations to all stocks for the entire fishing year, facilitating directed commercial groundfish fishing in all broad stock areas.

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

During the development of FW55, the Council considered multiple ABCs for witch flounder, along with separate SNE/MA yellowtail flounder sub-ACL values for the scallop fishery (Table 9). The Council considered two SNE/MA sub-ACLs for the scallop fishery (Table 115), one based on 90% of estimated catch (sub-Option 1A), and the other based on 100% (sub-Option 1B) of estimated catch. The difference between these sub-ACLs is likely to be negligible (32mt vs. 36mt) with respect to protected species impacts, particularly as the scallop fishery does not have an in-season AM for exceeding the sub-ACL. Scallop fishery catches of SNE/MA yellowtail flounder were greater than options proposed in both sub-options in FY 2013 and FY 2014 (Table 97).

With regard to witch flounder, the Council considered a range of witch flounder ABC's between 399 mt and 500 mt. Table 10 describes the corresponding range of sector level sub-ACLs. As catch limits can be considered a proxy for relative fishing effort, results from the quota change model (see Section 7.4) can be used to discern potential impacts between witch flounder sub-options for ecosystem components that consider the impacts of fishing effort and gear, such as protected and endangered species. Results of the QCM suggest that overall fishing effort would be constrained by GOM cod and GB cod quotas, not any of the witch flounder ABCs considered by the Council. As such, the overall impacts of each of the witch flounder sub-options is likely to be similar with respect to each other, and negative when considered in the context of FW53 sub-ACLs (Table 107). Due to the similarities in impacts between sub-options A and B, the impacts for Option 2 focus on the comparisons between No Action and Option 2 with the Council's preferred sub-options.

- *Option 2 – Preferred Alternative*
    - o *Sub-Option 1A – SNE/MA Yellowtail Flounder Scallop sub-ACL at 90% of Estimated Scallop Fishery Catch (Preferred Sub-Option)*
    - o *Sub-Option 2B –Witch Flounder ABC of 460 mt (Preferred Sub-Option)*

Option 2 would adopt new specifications for all 20 groundfish stocks (Table 10), based on the most recent scientific data. This measure includes the identification of ACLs, ABCs, and OFLs 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. Implementation of ACLs is required by the Magnuson-Stevens Act and may have protected species impacts that are difficult to define. The protected species impacts of ACL-setting in general are discussed in detail in Amendment 16.

For the US/Canada stocks, the U.S. TAC for EGB haddock, would decrease in Option 2, while the U.S. TAC for EGB increase and GB yellowtail flounder would increase slightly (Table 8). The EGB haddock TAC remains substantially higher than both the EGB cod and GB yellowtail TACs. This could lead to a shift in effort to the eastern area for EGB haddock, though it is likely that the EGB cod TAC would continue to constrain the full utilization of the EGB haddock quota (e.g. US EGB haddock TAC of 15,170 mt, and US EGB cod TAC of 138 mt). The quantitative consequences of these changes are unknown, although it is unlikely that full EGB haddock quota allocation will be achieved due to the constraints experienced by the EGB cod quota. As a result, fishing effort to its fullest potential will likely not be experienced and therefore, any effort increases are likely minimal in this area.

Option 2 would increase FY 2016 ACLs for GB and GOM haddock, GOM cod, GOM winter flounder, pollock, halibut, wolfish, and southern windowpane flounder. There would be several significant decreases FY 2016 ACLs, specifically witch flounder, SNE/MA yellowtail flounder, GB winter flounder, and GB cod. While there would be a small uptick in the GOM cod ACL, the status of the stock is poor and quotas remain near all-time lows. Under Option 2, the declining ACLs for several stocks are likely to constrain the directed fishery, and may significantly reduce fishing effort in all broad stock areas.

While the ACLs for some stocks are increasing, the new ACLs would be similar to or less than ACLs the fishery has operated under over the past four fishing years. The ACL for GB haddock has not been caught under sectors and thus, the quota is not a true reflection of fishing behaviors for this stock. That is, a higher quota does not necessarily equate to increases in fishing effort. For instance, in FY 2013, when the ACL was roughly 28,000 mt, approximately 5,000 mt higher than what is proposed, the fishery caught roughly 12% of the GB haddock quota and therefore, did not fish at its full potential. As quota increases to the ACL do not necessary equate to increases fishing effort and therefore, Option 2 is likely to have a negligible to low negative impact on protected species.

Based on the above information, it is anticipated that Option 2 would result in minimal, if any effort shifts. Further, as ACLs under Option 2 are not significantly greater than those authorized over the last several years, significant changes in effort are not expected under this Option and therefore, fishing behavior is expected to remain similar to current operating conditions. Taking these factors and pieces of information into consideration, below we have considered the impacts of Option 2 on protected species (MMPA protected and ESA listed species).

MMPA Protected Species Impacts

Impacts of Option 2 on marine mammals (i.e., species of cetaceans and pinnipeds) are somewhat uncertain as quantitative analysis has not been performed. However, we have considered, to the best of our ability, available information on marine mammal interactions with commercial fisheries, including the skate fishery over the last 5 or more years (Waring et al. 2014; Waring et al. 2015; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; www.nefsc.noaa.gov/fsb/take_reports/asm.html). Aside from several large whale species (e.g., North Atlantic right, humpback, and fin), harbor porpoise, and several stocks of bottlenose dolphin, there has been no indication that takes of any other marine mammal species in commercial fisheries has exceeded potential biological removal (PBR) thresholds, and therefore, gone above and beyond levels which would result in the inability of each species population to sustain itself (Waring et al. 2014, 2015). Although, as noted above, several species of large whales, harbor porpoise and several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR threshold, take reduction plans have been implemented to reduce bycatch in the fisheries affecting these species (Atlantic Large Whale Take Reduction Plan, Harbor Porpoise Take Reduction Plan, and the Bottlenose Dolphin Take Reduction Plan; see section 1.1 for details); these plans are still in place and are continuing to assist in decreasing bycatch levels for these species. Although the information presented in Waring et al. (2014, 2015) is a collective representation of commercial fishery interactions with marine mammals, and does not address the effects of any FMP specifically, the information does demonstrate that fishery operations over last 5 or more years have not resulted in a collective level of take that threatens the continued existence of marine mammal populations (aside from those species noted above).

In conjunction with the above, additional analysis on the impacts of the operation of fisheries in the northeast region have also been conducted by NMFS, pursuant to section 7 of the ESA, for ESA-listed species of marine mammals. Specifically, in a Biological Opinions issued by NMFS in 2013, it was concluded that the operation of the groundfish, in addition to seven other FMPs, may affect, but will not jeopardize the continued existence of any ESA listed species of marine mammals. Since issuance of these Opinions, there has been no indication that these fisheries have changed in any significant manner such that the level of marine mammal interactions has gone above and beyond those considered by NMFS in its assessment of fisheries affects to listed species (if they had, NMFS would have re-reinitiated the

Opinions). As a result, we do not expect impacts to ESA-listed species of marine mammals under Option 2 (i.e., status quo conditions) to be different from those already considered by NMFS (NMFS 2013). Specifically, fishing behavior under Option 2 is not expected to introduce any new risks to ESA listed species that have not already been considered by NMFS to date. As a result, Option 2 is not expected to result in interactions with marine mammals that are above and beyond levels previously considered by NMFS. Based on this, Option 2, and the resultant fishing behavior under this Alternative, is not, as concluded by NMFS, expected to result in interaction levels that would jeopardize the continued existence of ESA listed species of marine mammals.

Based on the above information, and the fact that the groundfish fishery must comply with specific take reduction plans (i.e., HPTRP, the BDTRP, ALWTRP), Option 2 is expected to have low negative to neutral impacts on marine mammal species. Relative to Option 1, Option 2 has higher ACLs which do not expire on July 31st of the fishing year, which may result in more negative impacts to marine mammals as higher allocations and the ability to operate throughout a full fishing year may result in increases in fishing effort, which may equate to increased interactions with marine mammals.

ESA Listed Species

Ascertaining the potential impacts of Option 2 on ESA-listed species (i.e., certain species of whales, sea turtles, and fish) are difficult and somewhat uncertain, as quantitative analysis has not been performed. However, we have considered, to the best of our ability, how the fishery has operated in regards to listed species since 2013, when NMFS issued a Biological Opinion (Opinion) on the operation of seven commercial fisheries, including the groundfish FMP, and its impact on ESA listed species (NMFS 2013). The 2013 Opinion concluded that the seven fisheries may affect, but would not jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon. The groundfish FMP is currently covered by the incidental take statement authorized in NMFS 2013 Opinion.

While specifications have fluctuated since 2013, fishing behavior over this time period has never resulted in the exceedance of NMFS authorized take of any ESA listed species (NMFS 2013). As specifications under Option 2 are no greater those authorized since 2013, and the resultant fishing behavior under these conditions are not expected to change significantly from current operating conditions, Option 2 is not expected to introduce any new risks or additional takes to ESA listed species that have not already been considered and authorized by NMFS to date. As a result, impacts of the Option 2 on ESA listed species are not expected to be different from those already considered by NMFS (NMFS 2013) and therefore, are not, as concluded by NMFS, expected to result in levels of take that would jeopardize the continued existence of ESA listed species. For these reasons, Option 2 would likely have low negative impacts on ESA listed species.

Overall Impacts to Protected Species

Relative to Option 1, Option 2 is likely to have more negative impacts to protected species. As Option 1 would result in overall reduced effort and a truncated fishing year, interaction risks under Option 1 are lower relative to Option 2. Option 2; however, with higher ACLs and the potential for a year-round directed commercial groundfish fishery, removes the reduced interaction risks afforded under Option 1 fishing conditions and therefore, the potential for interactions are higher under Option 2 relative to Option 1.

7.3.2 Fishery Program Administration

7.3.2.1 Implementation of an Additional Sector

The implementation of an additional sector is an administrative measure, and will not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior. The fishery would continue to operate under catch limits with accountability measures.

7.3.2.2 Sector Approval Process

Modifying the sector is an administrative measure, and will not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior. The fishery would continue to operate under catch limits with accountability measures.

7.3.2.3 Modification to the Definition of the Haddock Separator Trawl

Modifying the definition of the haddock separator trawl is an administrative measure, and will not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior. The fishery would continue to operate under catch limits with accountability measures.

7.3.3 Commercial and Recreational Fishery Measures

7.3.3.1 Groundfish Sector Monitoring Program

7.3.3.1.1 Option 1: No Action

This measure, if adopted, would maintain the monitoring requirements adopted by Amendment 16 and subsequent actions. The monitoring provisions in those actions were specifically adopted for monitoring groundfish catches, albeit additional information on encounters between fishing activity and protected and endangered species is provided via sector monitoring. In fact, since its inception in 2010, the sector monitoring program and the associated coverage levels have provided a wealth of information about protected species interactions in commercial fishing gear, thereby improving the precision of protected species bycatch analyses and resultant bycatch estimates (see Table 98). Indirectly, this affords positive impacts to protected species, as reducing uncertainty of the bycatch estimates improves assessments of anthropogenic removals from the population, as well as mitigation efforts in forums such as take reduction teams (NEFSC PSB, pers. comm). Based on this information, the No Action, which will maintain monitoring requirements as adopted by Amendment 16, is expected to have low positive impacts to protected species.

Relative to Option 2, which is administrative in nature relative to protected species impacts, the No Action is likely to have neutral impacts to protected species. When compared to Sub-Options 3A, 3B, or Option 5, which are likely to have lower coverage rates than the No Action, the No Action, is likely to have low positive impacts on protected species. Similarly, relative to Sub-Options 4A and 4B, which will remove coverage for a particular sub-set of sector gillnet trips, the No Action will have low positive impacts on protected species. For the rationale behind these conclusions, please see the following sections.

7.3.3.1.2 Option 2: Clarification on Groundfish Monitoring Goals (*Preferred Alternative*)

This is an administrative measure that revises the goals and objectives of the at-sea monitoring program. The option is not considered to directly impact protected species but does prioritize existing program goals and objectives.

7.3.3.1.3 Option 3: Clarification of methods used to set sector coverage rates

- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)
- Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

Sub-Option 3A: This option would clarify that the Council's preferred method for determining coverage levels for sectors is to use only the CVs achieved at the overall stock level, and that overall coverage levels should not be set using an administrative standard of setting coverage levels so that 80 percent of the discard estimates have CV30 at the sector/stock/gear level. Coverage levels will be lower relative to the No Action.

Sub-Option 3B: This option would specify a multi-year average of realized stock-level CVs and corresponding coverage rates that would be used when setting coverage levels on an annual basis. Coverage levels are expected to be lower than those under Option 3A and therefore, even lower than those experienced under the No Action.

Over the long term, either sub-option has the potential to result in coverage levels that are lower than levels currently experienced under the No Action. As a result, the informational benefits provided by current coverage levels in assessing protecting species bycatch (see Option 1) may be reduced, thereby affecting the precision of protected species bycatch estimates and reducing available information for protected species management decisions. As a result, either sub-option may result in low negative impacts to protected species if the number of interactions with protected species is underestimated.

Relative to Option 2, which is administrative in nature relative to protected species impacts, Sub-Options 3A and 3B is likely to have neutral impacts to protected species. When compared to Option 1, Sub-Options 3A and 3B, with lower coverage levels than the No Action, are likely to result in more negative impacts to protected species. Relative to Sub-Options 4A and 4B, which will remove coverage for a particular sub-set of sector gillnet trips, Sub-Options 3A and 3B will have low positive impacts on protected species. Relative to Option 5, Sub-Options 3A, which is likely to have higher coverage levels than those under Option 5, is likely to have more of a positive impact on protected species, while Sub-Option 3B, which is likely to have lower coverage levels than Option 5, is likely to have more of a negative impact on protected species
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7.3.3.1.4 Option 4: Remove ASM coverage requirements for a sub-set of sector gillnet trips

- Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear (*Preferred Alternative*)
- Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries

Sub-Option 4A: This Option would remove ASM requirements for sector gillnet trips fishing only ELM 10"+ in BSAs 2 and 4. Figure 11 and Figure 29 indicate sector ELM trips overlap in time and space with observed takes marine mammals throughout the northeast, particularly in the GOM (BSA 1), Inshore GB (BSA 2), and SNE (BSA 4).

As FY 2016 if the first full year in which sectors are expected to cover the cost of ASM, removing this requirement for a sub-set of sector trips may create an economic incentive to target non-groundfish stocks like skates, monkfish, and dogfish using 10"+ mesh. Although this has the potential to increase fishing effort, effort would still be constrained by quota allocations for these non-groundfish stocks. As a result, there is the potential that although effort will increase, the increase in effort will result in quota's being attained faster.

Sub-Option 4B would remove ASM requirements from sector trips that fish exclusively within the footprint and season of three existing spiny dogfish exemption areas. Sector vessels would be allowed to fish gillnets of 6.5" and greater, and would be required to retain all legal sized groundfish would count against their sector's ACE. The three dogfish exempted fisheries would be: Nantucket Shoals Dogfish Exemption Area, the Eastern Areas of the Cape Cod Spiny Dogfish Exemption Area, and the SNE Dogfish Exemption Area. Figure 11 and Figure 29 indicate that these exempted fisheries overlap in time and space with observed takes marine mammals to the east of Cape Cod and in southern New England.

ASM was paid for by NMFS from on May 1st, 2010 through December 31st, 2015. Over this time, sector vessels targeted non-groundfish stocks while on sector trips with very low catch of groundfish. As a portion of the fishery was already exhibiting this behavior when there was not an economic incentive, fishing effort present in these dogfish exemption areas is likely to be consistent with previous fishing years. Therefore, Sub-Option 4B is likely to have a low negative impact on protected resources. Compared to all other ASM options, sub-Option 4B is likely to have a low negative impact on protected resources.

Based on the above information, either sub-option has the potential to result in direct and indirect impacts to protected species. Direct impacts to protected species are likely to be seen via changes in fishing behavior resulting from the economic incentive created from either sub-option. As noted above, this could equate to increased effort and therefore, the potential for increased interactions with protected species; however, as also noted above, under this same scenario, quota constraints are likely to limit any significant increase in effort. In fact, redirecting effort to these stocks may result in quotas being caught faster. If quota is reached faster, this equates to gear being present for less time in the water. As interactions with protected species is strongly associated with amount and time gear is present in the water, any reduction in either of these will reduce the potential for interactions in these waters. As a result, direct impacts to protected species may range from low positive to low negative.

Indirectly; however, either sub-option may result in low negative impacts to protected species. As noted previously, since its inception in 2010, at-sea monitoring (ASM) data have provided a wealth of information about protected species interactions in commercial fishing gear, particularly in the extra-large mesh (>=8") sink gillnet fisheries (NEFSC PSB pers. comm). From 2010-2014, the number of hauls observed by ASM in the extra-large-mesh (ELM) fishery exceeded the number of hauls observed by traditional Northeast Fisheries Observer Program (NEFOP) observers, constituting 60% of all observed ELM hauls; moreover, ASM documented 63% of all protected species interactions in the ELM fisheries (NEFSC PSB pers. comm). Larger mesh sizes are correlated with higher bycatch rates of both loggerhead sea turtles (Murray 2013) and harbor porpoises (Hatch and Orphanides, 2015; Orphanides 2009), and possibly other species as well (e.g., Atlantic sturgeon; Stein *et al*. 2004; ASMFC 2007; Miller and Shepard 2011). While ASM data have supplemented NEFOP data in the Gulf of Maine and southern New England regions (Figure 29a,b), they have also provided information about ELM fishing practices and bycatch where NEFOP coverage did not (Figure 29c,d). The amount of information ASM data provide to protected species bycatch analyses improves the precision of bycatch estimates. For example, the addition of ASM information to an analysis of gray seal bycatch rates from May 2010-April 2011 reduced the coefficient of variation (CV) around the bycatch rates in almost all strata (Table 98, Graham et al. in review). Reducing uncertainty of bycatch estimates improves assessments of anthropogenic removals from the population, as well as mitigation efforts in forums such as take reduction teams. As sub-options 4A and AB will remove ASM coverage requirements for particular sector trips (see description of 4A and 4B above), the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch will be reduced (see Option 1), thereby affecting the precision of protected species bycatch estimates and reducing available information for protected species management decisions. As a result, indirectly, sub-option 4A or 4B would result in low negative impacts to protected species.

Based on the above information, impacts to protected species from Sub-Option 4A or 4B may range from low negative to low positive. Relative to Option 2, which is administrative in nature relative to protected species impacts, Sub-Options 4A and 4B are both likely to have neutral impacts to protected species. Cumulatively, relative to Option 1 and 5, and Sub-Options 3A and 3B, Sub-Options 4A and 4B, with the removal of ASM and potential increase in effort in the affected areas, has more of a negative impact on protected species.

Figure 29 - a) Number of ASM trips in extra-large (>=8”) mesh gillnet gear, 2010-2014; b) Number of NEFOP trips in extra-large (>=8”) mesh gillnet gear, 2010-2014; c) ASM extra-large mesh trips in 10’ squares where there was no NEFOP coverage; d) Observed interactions between extra-large mesh gillnet gear and protected species (birds, cetaceans, seals, turtles). Provided by NEFSC, Protected Species Branch.

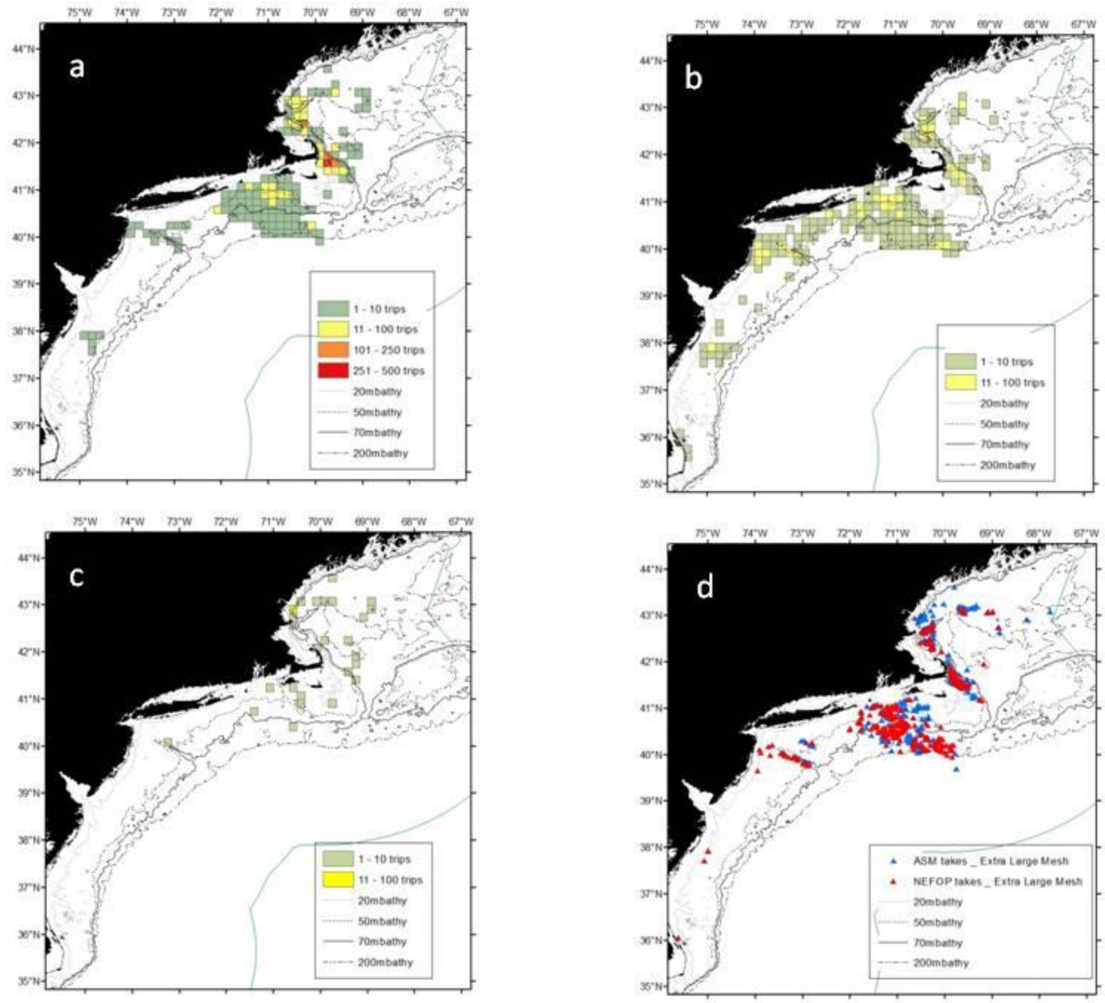

Table 98 - Comparison of estimated bycatch rates, coefficient of variation (CV) and 95% confidence intervals (CI) from a log-normal distribution after pooling NEFOP observer data with ASM data for gray seals in gillnet gear. Provided by NEFSC, Protected Species Branch.

NEFOP					GILLNET	ASM+NEFOP				
Number of Hauls	Gray Seal Takes	Bycatch Rate	CV	95% CI	Strata	Num of Hauls	Gray Seal Takes	Bycatch Rate	CV	95% CI
1,796	33	0.0184	0.18	0.013-0.026	All	7,850	161	0.0205	0.08	0.017-0.024
1,060	2	0.0019	0.50	0.001-0.005	Inshore GOM	4,621	15	0.0032	0.21	0.002-0.005
357	3	0.0084	0.46	0.004-0.020	Offshore GOM	1,393	5	0.0036	0.37	0.002-0.007
379	28	0.0739	0.20	0.050-0.109	SNE	1,836	141	0.0768	0.09	0.065-0.091
90	1	0.0111	0.72	0.003-0.039	Dogfish	714	1	0.0014	0.72	0.000-0.005
199	11	0.0553	0.29	0.031-0.097	Monkfish	919	71	0.0773	0.12	0.061-0.097
1,287	3	0.0023	0.48	0.001-0.006	Multispeci es	5,028	11	0.0022	0.24	0.001-0.003
220	18	0.0818	0.23	0.052-0.128	Skate	1,189	78	0.0656	0.10	0.054-0.080
657	18	0.0274	0.22	0.018-0.042	Jan-Apr 2011	1,728	86	0.0498	0.11	0.040-0.061
630	13	0.0206	0.33	0.011-0.039	May-Aug 2010	3,484	59	0.0169	0.13	0.013-0.022
509	2	0.0039	0.60	0.001-0.012	Sept-Dec 2010	2,638	16	0.0061	0.19	0.004-0.009

7.3.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

The application of a prioritization criteria would shift which stocks drive coverage based on the CV30 requirement, which in some years may decrease the coverage level when compared to No Action. Based on this information, we expect impacts to protected species to be similar to those provided in Option 3 (i.e., low negative; see section 1.1.3.1.3). .

Relative to Option 2, which is administrative in nature relative to protected species impacts, Option 5 is likely to have neutral impacts to protected species. When compared to Option 1, with higher coverage levels, Option 5 is likely to result in more negative impacts to protected species. Relative to Sub-Options 3A, Option 5, which is likely to have lower coverage levels than those under Sub-Option 3A, is likely to have more of a negative impact on protected species, while relative to Sub-Option 3B, Option 5, which is likely to have higher coverage levels than those under Sub-Option 3B, is likely to have more of a positive impact on protected species. Relative to Sub-Options 4A and 4B, which will remove ASM coverage for a particular sub-set of sector gillnet trips, Option 5 will have more of a positive impact on protected species.

Combination of Options

The Council's Preferred Alternative is Option 2, 3A, 3B, 4A and 5 (75/10). The Council clarified that Option 4B could be done through the sector exemption process if Option 4A was approved. Relative to the No Action/Option 1, the combination of these options results in a reduction in the overall observer coverage rate over the current approach. For FY 2016, the No Action would result in a total observer coverage rate of 41% while the combination of these options would result in a total coverage rate of 14% for the portion of sector vessels not fishing under the ELM exemption. As noted in the above sections, there are known interactions between protected resources an gillnet gear in areas where ASM would not be required, amounting to low negative impacts on protected species relative to No Action. The combination of options is likely to result in lower overall coverage levels for the sector fleet, and would likely have a low negative impact on protected species relative to No Action.

7.3.3.2 Management Measures for U.S. Georges Bank Cod TACs

7.3.3.2.1 Option 1: No Action

This option would not allow sectors to transfer eastern GB cod to the western fishery. The EGB cod quotas in FY 2016 are similar to those in FY 2015, while the quota available to the western fishery would decline sharply. The No Action is not expected to impact overall effort in the eastern area, and may lead to a decline of effort in the western portion of the stock area.

Based on above information, impacts to protected species are not expected to be any greater than those under current operating conditions (see Section 1.1.1.2 for further details to support this rationale), and in fact, may be less than status quo conditions. Specifically, fishing effort is likely to remain similar to status quo conditions or potentially decrease; the latter potentially equates to less fishing time, and therefore, gear being present in the water for a shorter duration. As protected species (ESA listed and MMPA protected species) interactions with gear, regardless of listing status, are greatly influenced by the amount of gear, and soak times, any decrease in either of these factors will reduce the potential for protected species interactions with gear and therefore, reduce the potential for serious injury or mortality to these species. As a result, Option 1 may have some positive impacts on protected species; however, as interactions may still occur under Option 1, overall, Option 2 is likely to have low positive to low negative impacts on protected species.

7.3.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod

This option allows sectors or state-operated permit banks, to transfer and harvest their EGB cod quota in the western GB stock area at any time during the fishing year. While it is unknown how much EGB quota would be transferred and harvested in the WGB area, the overall GB cod quota that is available to then entire fishery declined sharply from FY 2015 to FY 2016, and the amount of available quota for transfer out of the eastern area remains low relative to the entire GB cod ACL. Therefore, this alternative is not expected to increase fishing effort in the western area where observed interactions with protected species have generally been higher (refer to AE and map of interactions). Based on this information, impacts to protected species are expected to similar to those provided in Option 1; low positive to low negative. When compared to the No Action alternative, Option 2 is expected to have neutral impacts on protected resources.

7.3.3.3 Modification to the Gulf of Maine Cod Protection Measures

7.3.3.3.1 Option 1: No Action

There would be no changes to the GOM Cod Protection measures implemented on May 1, 2015 through FW 53. As a result, as provided in FW 53, impacts to protected species are expected to be low positive to neutral. For further details please see FW 53, section 7.3.2.1.3.2.

7.3.3.3.2 Option 2: Change in Authority to Modify GOM Cod Recreational Possession Limits

This option would allow the Regional Administrator (RA) to once again change the possession limit of GOM cod for the recreational fishery.. As the status of GOM cod is poor and ABCs are near all-time lows, any change in the GOM cod bag limit is expected to be small and therefore, changes in impacts to protected species from those provided in Option 1 are not expected. As a result, relative to Option 1, Option 2 is likely to have neutral impacts on protected species.

7.4 Economic Impacts

Introduction
Consideration of the economic impacts of the changes made in this framework is required pursuant to the National Environmental Policy Act (NEPA) of 1969 and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976. NEPA requires that before any federal agency may take “actions significantly affecting the quality of the human environment,” that agency must prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) that includes the integrated use of the social sciences (NEPA Section 102(2) (C)). The MSA stipulates that the social and economic impacts to all fishery stakeholders should be analyzed for each proposed fishery management measure to provide advice to the Council when making regulatory decisions (Magnuson-Stevens Section 1010627, 109-47).

The National Marine Fisheries Service (NMFS) provides guidelines to use when performing economic reviews of regulatory actions. The key dimensions for this analysis are expected changes in net benefits to fishery stakeholders, the distribution of benefits and costs within the industry, and changes in income and employment (NMFS 2007). Where possible, cumulative effects of regulations are identified and discussed. Non-economic social concerns are discussed in Section 7.5. The economic impacts presented here consist of both qualitative and quantitative analyses dependent on available data, resources, and the measurability of predicted outcomes. It is assumed throughout this analysis that changes in revenues would have downstream impacts on income levels and employment; however, these are only mentioned if directly quantifiable.

Impacts to the sector component of the groundfish fishery

<u>Methods</u>
The Quota Change Model (QCM) is used to analyze the impacts of each combination of measures on the sector portion of the groundfish fishery, which comprises over 98% of commercial groundfish landings and revenues. The QCM is a Monte Carlo simulation model that selects from existing records the most likely trips to take place under new regulatory conditions. To do this, a large pool of actual trips is created from a reference data set. The composition of this pool is conditioned on each trip’s utilization of allocated ACE, under the assumption that the most likely trips to take place in the FY being analyzed are those fishing efficiently under the new regulatory requirements. The more efficiently a trip uses its ACE, the more likely that trip is to be drawn into the sample pool. ACE efficiency is determined by the ratio of ACE expended to net revenues on a trip, iterated over each of the 17 allocated stocks. Net revenues are calculated as gross revenues minus trip costs minus quota opportunity costs, where trip costs are based on observer data and quota opportunity costs are estimated from an inter-sector lease value model, based here on FY 2014 (details on the methods can be found in Murphy et al. 2015).

After the sample pool has been constructed, trips are pulled from the pool at random, summing the ACE expended for the 17 allocated stocks as each trip is drawn. When one stock’s ACE reaches the sector sub-ACL limit, no further trips from that broad stock area are selected. The model continues selecting trips until sector sub-ACLs are achieved in all three broad stock areas or, alternatively, if sub-ACLs are reached for one of the unit stocks, the trip selection process ends for all broad stock areas at once. This selection process forms a “synthetic fishing year” and a number of years are drawn to form a model. Median values and confidence intervals for all draws in a model are reported.

By running simulations based on actual fishing trips, the model implicitly assumes that:

- Stock conditions, fishing practices and harvest technologies existing during the data period are representative;
- Trips are repeatable;

- Demand for groundfish is constant, noting that fish prices do vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;

- Quota opportunity costs and operating costs are both constant; and,

- ACE flows seamlessly from lesser to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded. Furthermore, because the fishery is modeled as a whole, allocations to individual sectors are not considered.

These assumptions will surely not hold—fishermen will continue to develop their technology and fishing practices to increase their efficiency, market conditions will induce additional behavioral changes, and fishery stock conditions are highly dynamic. Fuel and other operating costs may change due to larger economic shifts or shore-side industry consolidation.

The net effect of the constraints placed by these assumptions is unclear. The selection algorithm draws only efficient trips—fishermen making relatively inefficient trips will bias the model results high. Fishermen, however, are generally good at their job, and through a combination of technological improvement (gear rigging, equipment upgrades, etc.) or behavioral modifications, are likely to improve on their ability to avoid constraining stocks. If fishermen are able to make these adjustments, the model results will be biased low. It is important to mention that due to the number of potentially constraining groundfish stocks in FY2016, and the geographic range of these stocks, avoidance behavior may be more difficult and/or costly.

Additionally, the model will, in general, under-predict true landings and/or revenues if stock conditions for non-constraining stocks improve, if demand for groundfish rises, or if fishing practices change and fishermen become still more efficient at maximizing the value of their ACE. Conversely, the model will over-predict true landings and/or revenues if stock conditions of non-constraining stocks decline, markets deteriorate or fishing costs increase. Importantly, the model will over-predict landings if stock conditions for constraining stocks improve substantially and/or fishermen are unable to avoid the stock—in this circumstance, better than expected stock conditions will lead to worse than anticipated fishery performance. The opposite is also true—if a stock predicted to be constraining to the fishery becomes easier to avoid due to technological or behavioral improvements in targeting, or due to declining stock conditions, the model will under-predict revenues.

The model is intended to capture fishery wide behavioral changes with respect to groundfish sub-ACL changes, and groundfish catch is maximized by the constrained optimization algorithm. Catch of non-groundfish stocks on groundfish trips are captured in the model, but not explicitly modeled, such that constraints on other fisheries are not incorporated.

To model the impacts of the proposed measures, a few notable changes were made to previous iterations of the QCM. First, in previous FWs, the QCM drew from the most recent fishing year for which a full year of data was available. For FW55, such an approach implies that FY 2014 would be the input dataset for FY 2016. Because the interim action following the 2014 assessments for GOM cod (in-season time and area closures along with trip limits) and GOM haddock (in-season increase in the catch limit) influenced fishing behavior for portions of FY14, using that year as the only input data is not considered appropriate. Accordingly, trips from FY15 (through November) are added to supplement the FY14 trip data. Trips taken during FY14 and FY15 to areas that will be closed in FY16 are removed from the selection pool.

Second, industry-funded at-sea monitoring (ASM) is explicitly modeled within the QCM for the first time in FW55. The No Action simulation incorporates industry-funded ASM costs (at 22% of trips observed). In order to more fully highlight the effect of incorporating industry-funded ASM costs into the model separately from the effect of the ACL changes alone, separate simulations of the predicted outcomes from new FW55 ACLs were run with and without ASM costs in the model. ASM affects the types of trips likely to be taken by, primarily, negatively impacting trip-level net revenues. A sub-set of trips that are profitable under previous conditions will no longer be profitable with the addition of ASM costs. This has second-order effects on the distribution of catch across stocks as well as port and size class level impacts.

In order to estimate a total ASM cost to sectors for FY 2016 in the QCM, a separate cost simulation was run. This simulation was run over 10,000 iterations with the following specifications:

- ASM costs were estimated to fall between $675-725 per day initially. In order to simulate decreasing marginal costs of coverage, these costs were assumed to decrease with increases in coverage rates, reaching a range of between $410-445 per day.
- The number of whole-day (rounded) fishing days that the costs could be applied to was estimated to be between 17,000 and 22,000. This range was based off of predicted and realized effort since FY13, with effort being relatively stable since that time.
- Two levels of ASM coverage were evaluated in the QCM. A coverage level of 10% was chosen based on Option 5 in Section 4.3.1; though this is just one of many possible levels of coverage which could be selected for FY16. The median cost estimate for a 10% ASM coverage rate was $1.4 million for FY16. A coverage level of 37% was also evaluated to simulate status quo ASM coverage levels. The median cost estimate for a 37% ASM coverage rate was $4.6 million for FY16.

To apportion this total cost to individual trips, a per-groundfish-pound ASM cost was estimated. Total groundfish landings have been relatively stable from FY13 onward at around 50 million pounds of groundfish, and QCM simulations without ASM coverage indicate that this level of landings is likely to be maintained. A range of 45-55 million pounds was included in the simulation to estimate the per-pound ASM cost. The median per-pound cost to cover ASM costs at 10% coverage ($1.4 million total cost) for FY16 is estimated at $0.0273 (Figure 30). The median per-pound cost to cover ASM costs at 37% coverage ($4.6 million total cost) for FY16 is estimated at $0.0916 (Figure 30). These costs were applied to each pound of groundfish landed in the QCM, regardless of the ex-vessel price of the stock. Notice in Figure 1 that as coverage increases to high levels, the per-pound "cost" flattens out due to decreasing marginal costs of coverage. It should be noted that when simulating sector-based effort, the distribution of vessels enrolled in sectors and the common pool is assumed to be the same in FY16 as it is in FY15.

FW55 also is the first time in which a fishing year has been simulated under No Action ACLs. FW53 specified a 35% default rollover of specifications for sectors, which would allow a fishing year to operate until July 31st in the absence of new specifications being approved.

Groundfish vessels on groundfish trips form the unit of measurement for this analysis and gross revenues from groundfish trips and from groundfish species alone are reported metrics. Many groundfish fishermen are involved in other fisheries and groundfish trip revenues may represent anywhere from 100% to a small fraction of the total revenues of individual fishing business impacted by these regulations.

The QCM is a prediction model and it is import to understand its ability to predict groundfish fishing in the past. The model was developed during FY 2011 to make predictions for FW47 (FY 2012) and has been used in analyzing the impacts of all subsequent groundfish management actions that included ACL changes for the groundfish fishery. Table 99 summarizes its performance over the past few years.

Predictions for total revenue and groundfish revenue were within +- 10% of realized values for FYs 2012 and 2013 and for FY 2014 under the GOM cod and GOM haddock interim measures. The most accurate prediction for groundfish revenue came in FY 2013 when revenues were under-predicted by $1.6 million (2.7% of realized value). The most accurate prediction for total revenue came in FY 2012 when revenues were under-predicted by $0.8 million (0.9% of realized value). The FY 2011 over-prediction in groundfish revenue by 22% was caused primarily due to GB haddock rates being higher in the reference year (FY 2010) than the prediction year (FY 2011). If GB haddock revenues are backed out then gross revenues for groundfish are over-predicted by about 5%.

Cost predictions have been less accurate in general. For FYs 2011-2013, QCM demonstrated a low bias in predicting operations cost (those costs associated with making a fishing trip) such as fuel, ice, and food. This is because the model optimizes the trips taking place in the prediction year. The model predicts total catches and revenues somewhat accurately, but arrives at these totals from a substantially lower number of trips taken to obtain these catches. The FY 2014 prediction under the interim measures however did result in a slight over-prediction of operations cost. The reason for this is likely due to a sharp decline in fuel prices from FY 2012 (the input data for FY2014 predictions) to FY 2014. This change in fuel prices over time will be further discussed when summarizing the QCM results for FY 2016 later on in the economic impacts section.

Table 99 - Quota Change Model (QCM) predictions, FY 2011 - FY 2014, revenues in millions of dollars (2014).

	FY2011[A] Model Calibration		FY2012 (FW47, modified)		FY2013 (FW48)		FY2014 (FW51)		FY2014 (GOM haddock/cod EA[B])	
	Predicted[1]	Realized	Predicted[2]	Realized	Predicted[3]	Realized	Predicted[4]	Realized	Predicted[4]	Realized
Gross Revenue	137.8	121.4	92.3	93.1	75.5	79.2	71.0	87.7	81.0	87.7
Gross Groundfish Revenue	114.4	93.7	73.5	70.4	57.0	58.6	55.6	59.3	64.3	59.3
Operations Cost	30.4	32.9	17.8	31.5	15.0	26.1	21.6	22.4	24.3	22.4
Opportunity Cost of Quota	29.4	28.4	21.4	17.6	12.4	11.3	12.0	8.3	12.0	8.3
Sector Cost (of ASM)	3.3	2.7	1.9	2.0	1.8	1.8	1.6	2.0	1.7	2.0
Variable Cost*	63.1	64	41.1	51.1	29.2	39.2	35.2	32.7	38.0	32.7
Pct. Gross revenues net variable costs	54%	47%	55%	45%	61%	51%	50%	63%	53%	63%

[1]Reference pool = FY2010
[2]Reference pool = FY2010-11 (last six months FY2010, first six months FY11)
[3]Reference pool = FY2012
[4]Reference pool = FY2013

[A]FY 2011 revenues from GB haddock were predicted at $25.2 million. Realized revenues from GB haddock were $11.7 million.

[B]Based on interim measures for GOM cod and GOM haddock

*Variable cost is defined as the sum of operations cost, opportunity cost of quota, and sector cost. Note that other opportunity costs, such as capital and labor, are not included.

Data

Data Management and Imputation System (DMIS) data are used throughout. DMIS derives sub-trip/stock level landings and discards from Vessel, Dealer and Observer reports as well as the Sector and Permit databases maintained by NMFS GARFO and NEFSC.

General Overall Results

Table 100 describes the witch flounder ABC and overall coverall rate associated with each QCM model iteration constructed for FW55 analyses. QCM run F was the Council's preferred alternation for section 4.1.2, Annual catch limits.

Table 100 - Specifications and coverage levels assoicated with each QCM run for FW55.

QCM	Model	Witch Flounder ACL	Witch Flounder ABC	Total ASM Coverage (NEFOP + ASM)	ASM Coverage
A	FY2015 (FW53, No ASM Cost	598mt	783mt	No ASM Cost for Industry	No ASM Cost for Industry
B	No Action, default specs, 37% ASM	208mt	274mt	41%	37%
C	FW55 ACLs, Witch flounder 304mt, no ASM cost	304mt	399mt	No ASM Cost for Industry	No ASM Cost for Industry
D	FW55 ACLs, Witch fl = 304 mt, 10% ASM (Sub-Option 2A)	304mt	399mt	14%	10%
E	FW55 ACLs, Witch fl = 304 mt, 37% ASM	304mt	399mt	41%	37%
F	FW55 ACLs, Witch fl = 361 mt, 10% ASM (Sub-Option 2B)*	361mt	460mt	14%	10%
G	FW55 ACLs, Witch fl = 418 mt, 10% ASM	418mt	521mt	14%	10%
*Council's Preferred Alternative					

FY 2016 predictions for No Action ACLs, revised ACLs without industry-funded ASM, and revised ACLs with industry-funded ASM (at 10% and 37% coverage) are presented in Table 107. Additional predictions for witch flounder sub-ACLs of 361 mt and 418 mt are also presented in Table 5.

- No Action ACLs for FY16 (QCM B), predicted revenue from groundfish trips is $4.5 million, a 94% decline from the FY15 prediction in FW53 (with no ASM costs). Groundfish revenue from groundfish trips is predicted to be $3.2 million, a 95% decline from the FY15 prediction.
- Under QCM C, with revised ACLs and no industry-funded ASM, total revenues on groundfish trips are predicted to drop from $76.3 million in FY15 to $69.0 million in FY16, a 10% decline from FY15 predictions. Revenue from groundfish only on groundfish trips are predicted to drop from $59.2 million in FY15 to $52.4 million in the absence of industry-funded ASM, a 11% decline from FY15 predictions.
- Similarly, under QCM D with revised ACLs and industry-funded ASM (at 10% coverage), total revenues are predicted to drop to $68.8 million in FY16, a 10% decline from FY15 (with no ASM costs). Revenues from groundfish on groundfish trips are predicted to drop to $52.4 million in FY16, an 11% decline from FY15.

- Similarly, under QCM E with revised ACLs and industry-funded ASM (at 37% coverage), total revenues are predicted to drop to $68.8 million in FY16, a 10% decline from FY15 (with no ASM costs). Revenues from groundfish on groundfish trips are predicted to drop to $52.3 million in FY16, a 12% decline from FY15.
- Under FW 55, the Council also considered an increase in the sector ACL for witch flounder. For the set of FW55 ACLs analyzed above, the ACL for witch flounder was 304 metric tons. This corresponds with an ABC at 75% Fmsy. The Council considered a range of increases up to Fmsy (QCM G). Two additional scenarios were evaluated with the QCM: 1) witch flounder ACL of 361 metric tons at 10% ASM (QCM F, Council Preferred), and 2) witch flounder ACL of 418 metric tons at 10% ASM (QCM G). Predicted revenues on groundfish trips are $68.8 million, and $67.9 million, respectively. Predicted groundfish revenues are $52.2 million, and $51.5 million, respectively.

Model results indicate that gross revenues are predicted to be essentially unchanged with and without industry-funded ASM. Between no ASM and 10% coverage there was a $0.2 million drop in total revenue and no further reduction at 37%. Groundfish revenue remained unchanged between no ASM and 10% and a $0.1 million reduction at 37%. Within the model, trips that become un-profitable due to ASM costs are not selected. Because of this, one might expect gross revenues to decline more substantially under the industry-funded ASM option. However, as more trips are unprofitable under ASM, the model is forced to select a greater number of more efficient trips. The result is that gross revenues are nearly equal between the two options. Net revenues with industry-funded ASM, however, are predicted to be lower because vessels would be responsible for the cost of ASM coverage while gross revenues remain unchanged. Also, as mentioned in the methods section, the QCM assumes the requirement for industry-funded ASM in FY16 for sectors will not result in a shift of vessels from sectors to the common pool. The predicted revenues under the no-ASM option are similar to the industry-funded ASM option. Therefore, the discussion of stock level predictions and distributional predictions (as follows) focuses on the industry-funded ASM option only, which assumes 10% coverage and an ASM cost of $0.0273 per lb.
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The fact that total revenue and groundfish revenue predicted in the QCM is essentially unchanged whether there is no industry-funded ASM, 10% ASM, or 37% ASM is not especially surprising when considering the model assumptions (QCM C, D, E, see Table 107). The QCM simulates fishing years until quotas have been reached in all broad stock areas. The model assumes that ACE flows freely from lessor to lessee. With a higher ASM coverage rate (and thereby higher ASM cost), more sector trips will become unprofitable. As the ACE from these trips that are no longer profitable immediately flows to another sector member, then revenue will not change by the implementation of ASM alone. In reality, because of the presence of transaction costs, industry-funded ASM may in fact reduce gross revenues.

Table 108provides predicted stock-level results for FY15 (with no ASM costs) followed by the three and four QCM scenarios predicted for FY16 (Table 109, Table 110, Table 111, Table 112). Under industry-funded ASM of 10% in FY16 (Table 111), the three stocks with the largest absolute increase in average revenue compared to FY15 (Table 4) are redfish ($3.74.3 million), pollock ($1.28 million), and GOM haddock and white hake ($0.78 million). The three stocks with the largest absolute decrease from FY15 to FY16 are GB winter flounder ($4.34 million), GB cod ($3.5 million), and witch flounder ($1.34 million). Results at an ASM coverage rate of 37% (Table 7B) and with no ASM are similar (Table 6). In terms of utilization rates, Table 7 shows the highest predicted utilization rates, assuming industry-funded ASM of 10%, to be GB cod West (100%), GOM cod (98%), SNE/MA yellowtail flounder (956%), and witch flounder (91%). Whereas, Table 4 shows that for FY15, the highest predicted utilization rates are for GB winter flounder, GOM cod, and SNE/MA yellowtail flounder are all at 100%, and 95% for GB cod West.

In terms of groundfish revenue at the port level (Table 103), Boston and Gloucester are predicted to see revenue increases ($4.03 million and $2.49 million, respectively) relative to FY15, assuming industry-funded ASM at 2210% in FY16. Ports predicted to see groundfish revenue decreases relative to FY15 include New Bedford ($7.97 million), Point Judith ($1.1 million), and Portland ($1.60.9 million). At the state level, all states are predicted to see revenue decreases relative to FY15, with the exception of New Hampshire which is predicted to see revenue increases ($0.23 million). In terms of absolute decreases, Massachusetts, Rhode Island is predicted to see the largest decline in revenue at $2.41.7 million, followed by Rhode Island, Massachusetts ($1.74 million), and Maine ($1.82 million). Results at an ASM coverage rate of 37% and with no ASM are similar.

In terms of groundfish revenue by vessel length (Table 104), vessels of 75'+ are predicted to see the largest revenue decreases both in terms of absolute value ($9.98.4 million) and percentage (22.626.7%) relative to FY15, assuming industry-funded ASM in FY16 at 2210%. Vessels in the 30-<50' category are predicted to have slight gains in revenue relative to FY15 with an increase of $0.12 million, a 2.2% increase representing 4.4% of predicted FY15 revenues. Vessels in the 50-75' category are predicted to see revenue increases of $3.24 million, representing a 19.718.5% increase from predicted FY 15 revenues. Results at an ASM coverage rate of 37% and with no ASM coverage are similar.

Witch Flounder discussion:

Witch Flounder sector sub-ACL of 361 mt and 418 mt

The QCM was used to evaluate the impact of increasing the witch flounder sector sub-ACL from 304 mt (QCM D) to 361 mt (QCM F) and 418 mt (QCM G), assuming industry-funded ASM at 10% coverage. The results show that total revenues on groundfish trips are predicted to remain the same between 304 mt and 361 mt and decrease from $68.8 million to $67.9 million. Groundfish revenues are predicted to decrease slightly from $52.4 million to $52.2 million between 304 mt and 361 mt and further decline to $51.5 million at 418 mt. This decrease, although small, in groundfish revenue with a higher witch flounder sub-ACL is somewhat surprising given the wide geographic range of witch flounder and the fact that it is often caught with other groundfish species. Revenue from witch flounder is predicted to increase by $0.2 million from $1.4 to $1.6 million with the higher sector sub-ACL of 361 mt (Table 101) and increase an additional $0.2 at 418 mt (Table 102). However, the confidence intervals show that there is uncertainty surrounding these estimates and this change is within those confidence intervals. The discussion below examines output from the model but these differences are likely to be largely a result of random noise in the model. They should be interpreted with caution. The fact that there are multiple stocks across broad stock areas which are predicted to have high utilization rates further adds uncertainty into the model.

The model consistently showed other stocks (GB cod and GOM cod) to be more constraining than witch flounder and this is likely the primary reason that total and groundfish revenue increases did not materialize with a higher sub-ACL for witch flounder. Witch flounder-related revenue did increase across sector vessels when the sub-ACL was increased from 304mt to 418mt. However, these increases were offset by small, across the board, reductions in most other stocks. One exception is seen in the median revenue from plaice, a stock that is frequently caught with witch flounder, increased by $0.2.

In terms of witch flounder median utilization rates, a decrease occurred from 91% with a sub-ACL of 304 mt to 81% with a sub-ACL of 418mt. While witch flounder catch (and revenue) did increase when the sub-ACL was raised, the rate of increase was less than the rate of quota increase, resulting in a drop in utilization rates.

In terms of distributional changes, when the witch flounder sector sub-ACL is increased from 304mt to 418mt, vessels of 30' to <50' are predicted to see groundfish revenue increases of roughly $100,000. Conversely, vessels 50' to 75' and vessels 75'+ are each predicted to see revenue decreases of $600,000

(Table 104). At the port level, the model predicts Portland, ME to be negatively impacted by a higher witch flounder sector sub-ACL, with revenues dropping by about $800,000 with a sub-ACL of 418mt relative to a 304 mt sub-ACL. Point Judith, RI is predicted to see the largest increase in groundfish revenue with about a $100,000 increase when the sub-ACL is raised from 304mt to 418mt (Table 103).

Table 101 - Stock level QCM F results: Witch Flounder ACL = 361 mt, ASM coverage = 10%.

spec	stock	Sub-ACL (mt)	Catch (mt)	Utilization	Revenue	p5 Revenue	p95 Revenue
haddock	gb_west	34,156	4,511	13%	$9,619,547	$8,477,777	$11,136,968
pollock	all	17,705	3,739	21%	$9,519,442	$8,835,447	$10,129,188
redfish	all	9,471	6,860	72%	$8,249,643	$7,481,355	$8,983,051
wh_hake	all	3,434	1,780	52%	$5,643,127	$5,247,860	$6,059,865
am_plaice	all	1,160	961	83%	$3,792,658	$3,545,718	$4,052,475
haddock	gb_east	17,053	1,574	9%	$3,290,543	$2,735,722	$3,853,793
winter_fl	gb	584	456	78%	$2,464,177	$2,063,073	$2,982,185
cod	gb_west	550	547	99%	$2,350,159	$2,248,421	$2,419,797
witch_fl	all	361	310	86%	$1,640,041	$1,542,188	$1,744,639
winter_fl	sne_ma	514	372	72%	$1,618,936	$1,259,053	$1,981,223
cod	gom	273	268	98%	$1,169,096	$1,120,279	$1,192,750
haddock	gom	2,385	365	15%	$1,085,528	$968,286	$1,214,118
yt_flounder	cc_gom	325	177	54%	$452,425	$390,519	$529,014
yt_flounder	sne	145	138	95%	$402,312	$359,542	$445,152
winter_fl	gom	604	85	14%	$322,167	$267,888	$392,386
halibut	all	0	45		$272,892	$256,093	$291,786
cod	gb_east	45	35	77%	$146,979	$115,322	$186,890
yt_flounder	gb	207	22	10%	$64,542	$44,426	$84,459
windowpane	north	0	78		$33	$10	$88
ocean_pout	all	0	28				
windowpane	south	0	68				
wolffish	all	0	17				
non_gfish	all	0	9,001		$16,634,934	$15,412,141	$18,206,727
				Total Groundfish	$52,241,216	$49,728,505	$54,481,247
				Total	$68,811,671	$65,966,465	$71,485,695

Table 102 - Stock Level QCM G Results: Witch Flounder ACL = 418mt, ASM coverage 10%

spec	stock	Sub-ACL (mt)	Catch (mt)	Utilization	Revenue	p5 Revenue	p95 Revenue
haddock	gb_west	34,156	4,409	13%	$9,336,984	$8,155,337	$10,808,036
pollock	all	17,705	3,610	20%	$9,207,763	$8,607,823	$9,832,645
redfish	all	9,471	6,606	70%	$7,923,128	$7,096,174	$8,882,084
wh_hake	all	3,434	1,749	51%	$5,540,949	$5,148,018	$5,898,564
am_plaice	all	1,160	981	85%	$3,814,876	$3,563,550	$4,105,014
haddock	gb_east	17,053	1,474	9%	$3,102,593	$2,662,447	$3,651,116
winter_fl	gb	584	516	88%	$2,723,383	$2,251,764	$3,144,291
cod	gb_west	550	547	99%	$2,334,854	$2,232,986	$2,406,795
witch_fl	all	418	340	81%	$1,787,103	$1,672,827	$1,908,936
winter_fl	sne_ma	514	371	72%	$1,578,361	$1,286,441	$1,944,791
cod	gom	273	268	98%	$1,174,548	$1,125,442	$1,196,334
haddock	gom	2,385	366	15%	$1,090,557	$976,185	$1,208,185
yt_flounder	cc_gom	325	194	60%	$486,358	$423,252	$558,784
yt_flounder	sne	145	139	96%	$390,079	$342,352	$439,346
winter_fl	gom	604	88	15%	$338,466	$282,058	$418,165
halibut	all	0	45		$265,929	$246,941	$283,478
cod	gb_east	45	34	76%	$145,442	$116,161	$178,728
yt_flounder	gb	207	20	10%	$60,877	$45,640	$79,751
windowpane	north	0	79		$33	$1	$92
ocean_pout	all	0	29				
windowpane	south	0	68				
wolffish	all	0	17				
non_gfish	all	0	8,974		$16,419,511	$14,937,969	$18,031,233
				Total Groundfish	$51,460,759	$48,852,672	$53,742,609
				Total	$67,870,837	$64,509,734	$70,658,753

Table 103 - Port Level QCM Results: Witch Flounder ACL = 361mt (QCM F) and 418 mt (QCM G), ASM coverage = 10%, revenues in millions of dollars.

	QCM F - Witch Flounder ACL = 361 mt			QCM G - Witch Flounder ACL = 418 mt		
	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev
Connecticut	0.0	0.0	0.0	0.0	0.0	0.0
Massachusetts	38.6	35.0	42.5	38.3	34.1	42.4
Boston	16.7	15.3	18.1	16.6	14.9	18.0
Gloucester	10.8	9.9	11.7	10.5	9.3	11.6
New Bedford	9.0	8.1	10.0	9.1	8.1	10.0
Maine	10.8	9.4	12.2	10.3	9.1	11.9
Portland	9.5	8.3	10.7	9.0	7.9	10.3
New Hampshire	1.4	1.2	1.7	1.4	1.2	1.7
New Jersey	0.0	0.0	0.0	0.0	0.0	0.0
New York	0.2	0.2	0.3	0.3	0.2	0.4
Rhode Island	1.0	0.8	1.3	1.0	0.8	1.3
Point Judith	0.8	0.7	1.0	0.9	0.7	1.0
Other Northeast	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	52.2	49.7	54.5	51.5	48.9	53.7

Table 104 - Vessel Size Level QCM Results: Witch Flounder ACL = 361 mt (QCM F) and 418 mt (QCM G), ASM coverage = 10%. Revenues in millions of dollars.

	QCM F - Witch Flounder ACL = 361 mt			QCM G - Witch Flounder ACL = 418 mt		
Length class	**Rev**	**p5 rev**	**p95 rev**	**Rev**	**p5 rev**	**p95 rev**
<30'	0.2	0.1	0.3	0.2	0.1	0.3
30'to<50'	4.5	4.1	4.9	4.7	4.3	5.0
50'to<75'	20.0	18.8	21.4	19.9	18.6	21.3
75'+	27.4	25.3	29.6	26.6	24.7	28.6
TOTAL	52.2	49.7	54.5	51.5	48.9	53.7

Discussion (concerning results with a witch flounder sub-ACL of 304mt)

Several findings from the QCM stand out. The first is that the impacts of FW55 quota changes are predicted to have serious distributional impacts. Specifically, ports such as Point Judith, RI and New Bedford, MA, as well as more southern ports in New Jersey and New York, are predicted to see declines in gross revenues on the order of 47-100%. New Bedford alone is predicted to lose 47% from its predicted FY15 groundfish revenues, or $7.9 million dollars. Rhode Island is predicted to lose 65% of its FY15 gross revenues from groundfish. Conversely, Boston and Gloucester are predicted to see large increases in gross groundfish revenues (31 and 29%, respectively). These large changes indicate a high degree of uncertainty for the fishery, as businesses strive to re-balance their catch with their allocations. Importantly, four stocks are predicted to be constraining: GOM cod, GB cod, SNE/MA yellowtail flounder, and witch flounder. The geographic breadth of these constraining stocks has no precedent over the past five years of the Sector system.

Redfish landings are predicted to increase by 75% to roughly 7,000 mt in FY16. Redfish ex-vessel prices are also predicted to increase by 8% to $.55/lb. This combination results in a redfish-revenue increase from $4.8 million in FY15 to $8.5 million in FY16, a 77% increase. Under the FW55 sector sub-ACLs, redfish trips are among the most profitable, with or without industry-funded ASM coverage. While the model assumes that trips are replicable, this level of redfish landings and revenues should be considered uncertain since the market has not previously seen these volumes.

On the other hand, and as discussed in the methods section, the QCM has generally under-predicted fishery-wide revenues. Groundfish fishermen have found ways to optimize around new constraints (namely lower quotas) in the past and they will attempt to do so in FY16 as well. An increase in catch per unit effort (CPUE), especially for stocks with high quotas (e.g., redfish, GB haddock, pollock, and white hake) could drive revenues higher than predicted as well.

Lastly, the industry-funded ASM requirement for sectors in FY16 is not predicted to decrease total revenue, but will result in a decrease in net revenue as ASM is predicted to cost sectors $1.3 million (at 10% ASM coverage) or $4.4 million (at 37% ASM coverage) in FY16. One bright spot for the groundfish fishery is the decline of fuel prices in recent months (Figure 31). Noting that the number of trips taken, and predicted, is roughly stable from 2013-2016, lower fuel prices contribute significantly to a predicted $5 million reduction in fleet-wide variable costs from FY14-FY16. However, if ASM costs materialize as modeled here, the $1.3 to $4.4 million cost will erode a fairly large portion of the savings generated by lower fuel costs.

Table 105 - Comparison of FY 2015 and FY 2016 trip and sea-day predictions under different ASM coverage rates.

	Number of Trips	Days Absent
FY15 prediction (FW53)	5,452	13,728
FY 16 prediction (10% ASM)	5,474	12,847
FY 16 prediction (37% ASM)	5,561	12,857

Table 106 - Comparison of FY 2015 and FY 2016 variable cost predictions under different ASM coverage rates.

{Values in millions}	Trip Costs (Fuel, food, ice)	Opportunity Cost of Quota	Sector Fees	ASM Cost	Total Variable Cost
FY15 prediction (FW53)	$22.7	$6.0	$1.6	$0.0	$30.4
FY 16 prediction (10% ASM)	$16.7	$5.8	$1.9	$1.3	$25.7
FY 16 prediction (37% ASM)	$16.6	$5.8	$1.9	$4.4	$28.6

Table 107 - FY 2016 QCM predictions with 5% and 95% confidence intervals and changes from FY 2015 predictions (nominal dollars).

		All groundfish trips, gross			All groundfish, gross			% Change from FY15 - Groundfish trips	% Change from FY15 - Groundfish
QCM	**Model**	**Revenues**	**p5 Revenues**	**p95 Revenues**	**Revenues**	**p5 Revenues**	**p95 Revenues**		
A	**FY15 (FW53 – no ASM)**	76.3	69.3	83.3	59.2	53.2	65.1		
B	**NO ACTION (37% ASM)**	4.5	0.5	19.9	3.2	0.4	14.2	-94%	-95%
C	**FW55 ACLs, Witch fl = 304 mt, no ASM**	69.0	66.3	71.8	52.4	50.2	54.5	-10%	-11%
D	**FW55 ACLs, Witch fl = 304 mt, 10% ASM**	68.8	65.9	72.0	52.4	50.2	54.8	-10%	-11%
E	**FW55 ACLs, Witch fl = 304 mt, 37% ASM**	68.8	66.1	71.6	52.3	50.2	54.6	-10%	-12%
F	**FW55 ACLs, Witch fl = 361 mt, 10% ASM**	68.8	66.0	71.5	52.2	49.7	54.5	-10%	-12%
G	**FW55 ACLs, Witch fl = 418 mt, 10% ASM**	67.9	64.5	70.7	51.5	48.9	53.7	-11%	-14%

Table 108 - FW53 (FY 2015) QCM A stock-level catch and revenue predictions with 5% and 95% confidence intervals (nominal dollars).

	FW53 (FY15 – no ASM)					
	Sub-ACL	**Catch**	**Utilization**	**Revenue**	p5 Revenue	p95 Revenue
Redfish	10,988	4,306	39%	4.8	4.2	5.3
GB Haddock West	16,206	4,597	28%	11.6	10.0	13.2
Pollock	13,632	3,880	28%	8.6	8.0	9.3
White Hake	4,313	1,757	41%	5.2	4.8	5.6
GB Haddock East	5,402	1,122	21%	2.7	2.2	3.3
Plaice	1,382	1,235	89%	4.2	3.9	4.5
GB Winter Flounder	1,875	1,867	100%	6.9	6.4	7.3
GB Cod West	1,629	1,550	95%	5.8	5.2	6.1
SNE Winter Flounder	1,147	839	73%	2.7	2.3	3.1
Witch Flounder	598	533	89%	2.7	2.5	2.9
GOM Cod	202	201	100%	1.0	1.0	1.0
GOM Haddock	948	128	13%	0.4	0.4	0.5
CC/GOM Yellowtail Flounder	443	147	33%	0.4	0.4	0.5
SNE/MA Yellowtail Flounder	457	457	100%	1.4	1.3	1.5
GOM Winter Flounder	375	82	22%	0.3	0.2	0.3
Halibut	0	47	0%	0.2	0.2	0.2
GB Yellowtail Flounder	192	52	27%	0.2	0.1	0.4
GB Cod East	124	30	24%	0.1	0.1	0.1
Northern Windowpane	0	245	0%	0.0	0.0	0.0
Ocean Pout	0	35	0%	0.0	0.0	0.0
Southern Windowpane	0	138	0%	0.0	0.0	0.0
Wolffish	0	14	0%	0.0	0.0	0.0
Non groundfish	0	9,369	0%	17.1	16.1	18.2
Total		32,631		76.3	69.3	83.3

Table 109 - FY 2016 QCM B stock-level catch and revenue predictions with 5% and 95% confidence intervals for the No Action Alternative (nominal dollars).

	NO ACTION (with ASM of 37%)					
	Sub-ACL	**Catch**	**Utilization**	**Revenue**	**p5 Revenue**	**p95 Revenue**
Redfish	3840	275	7%	0.3	0.0	1.6
GB Haddock West	7548	327	4%	0.7	0.0	3.1
Pollock	13628	258	2%	0.7	0.1	3.1
White Hake	4250	110	3%	0.4	0.0	1.6
GB Haddock East	0	0		0.0	0.0	0.0
Plaice	483	38	8%	0.2	0.0	0.7
GB Winter Flounder	1967	71	4%	0.3	0.0	1.7
GB Cod West	612	37	6%	0.2	0.0	0.7
SNE Winter Flounder	402	33	8%	0.2	0.0	0.7
Witch Flounder	208	14	7%	0.1	0.0	0.3
GOM Cod	201	16	8%	0.1	0.0	0.3
GOM Haddock	1155	21	2%	0.1	0.0	0.3
CC/GOM Yellowtail Flounder	153	7	5%	0.0	0.0	0.1
SNE/MA Yellowtail Flounder	155	19	12%	0.1	0.0	0.2
GOM Winter Flounder	375	3	1%	0.0	0.0	0.1
Halibut	0	3		0.0	0.0	0.1
GB Yellowtail Flounder	274	2	1%	0.0	0.0	0.0
GB Cod East	0	0		0.0	0.0	0.0
Northern Windowpane	0	7		0.0	0.0	0.0
Ocean Pout	0	2		0.0	0.0	0.0
Southern Windowpane	0	7		0.0	0.0	0.0
Wolffish	0	1		0.0	0.0	0.0
Non groundfish	0	709		1.3	0.1	5.5
Total		1,960		4.5	0.5	19.9

Table 110 - FY 2016 QCM C stock-level catch and revenue predictions with 5% and 95% confidence intervals for FY 2016 sector sub-ACLs without industry-funded ASM coverage (nominal dollars).

	WITHOUT ASM					
	Sub-ACL	**Catch**	**Utilization**	**Revenue**	**p5 Revenue**	**p95 Revenue**
Redfish	9,471	7,017	74%	8.4	7.5	9.2
GB Haddock West	34,156	4,537	13%	9.7	8.7	11.0
Pollock	17,705	3,778	21%	9.7	9.1	10.3
White Hake	3,434	1,787	52%	5.7	5.3	6.2
GB Haddock East	17,053	1,562	9%	3.3	2.8	3.8
Plaice	1,160	912	79%	3.6	3.3	3.9
GB Winter Flounder	584	491	84%	2.6	2.1	3.0
GB Cod West	550	547	100%	2.4	2.3	2.4
SNE Winter Flounder	514	391	76%	1.7	1.4	2.0
Witch Flounder	304	278	91%	1.4	1.3	1.6
GOM Cod	273	268	98%	1.2	1.1	1.2
GOM Haddock	2,385	362	15%	1.1	0.9	1.2
CC/GOM Yellowtail Flounder	325	162	50%	0.4	0.4	0.5
SNE/MA Yellowtail Flounder	145	143	99%	0.4	0.4	0.5
GOM Winter Flounder	604	80	13%	0.3	0.2	0.4
Halibut	0	46		0.3	0.3	0.3
GB Yellowtail Flounder	207	21	10%	0.1	0.0	0.1
GB Cod East	45	35	78%	0.1	0.1	0.2
Northern Windowpane	0	82		0.0	0.0	0.0
Ocean Pout	0	28		0.0	0.0	0.0
Southern Windowpane	0	68		0.0	0.0	0.0
Wolffish	0	17		0.0	0.0	0.0
Non groundfish	0	9,018		16.6	15.3	18.0
Total		31,631		69.0	66.3	71.8

Table 111 - FY 2016 QCM D stock-level catch and revenue predictions with 5% and 95% confidence intervals for FY 2016 sector sub-ACLs with industry funded ASM coverage (nominal dollars).

	WITH ASM (10%)					
	Sub-ACL	**Catch**	**Utilization**	**Revenue**	p5 Revenue	p95 Revenue
Redfish	9,471	7,052	74.5%	8.5	7.6	9.4
GB Haddock West	34,156	4,447	13.0%	9.6	8.5	10.8
Pollock	17,705	3,804	21.5%	9.8	9.2	10.4
White Hake	3,434	1,793	52.2%	5.7	5.4	6.1
GB Haddock East	17,053	1,558	9.1%	3.3	2.8	3.8
Plaice	1,160	911	78.5%	3.6	3.3	3.8
GB Winter Flounder	584	506	86.7%	2.6	2.2	3.0
GB Cod West	550	547	99.5%	2.3	2.2	2.4
SNE Winter Flounder	514	385	74.8%	1.7	1.3	2.1
Witch Flounder	304	277	91.0%	1.4	1.3	1.6
GOM Cod	273	268	98.3%	1.2	1.1	1.2
GOM Haddock	2,385	357	15.0%	1.1	1.0	1.2
CC/GOM Yellowtail Flounder	325	173	53.1%	0.4	0.4	0.5
SNE/MA Yellowtail Flounder	145	138	95.0%	0.4	0.4	0.5
GOM Winter Flounder	604	85	14.1%	0.3	0.3	0.4
Halibut	0	46		0.3	0.3	0.3
GB Yellowtail Flounder	207	22	10.8%	0.1	0.0	0.1
GB Cod East	45	35	78.3%	0.1	0.1	0.2
Northern Windowpane	0	78		0.0	0.0	0.0
Ocean Pout	0	29		0.0	0.0	0.0
Southern Windowpane	0	67		0.0	0.0	0.0
Wolffish	0	17		0.0	0.0	0.0
Non groundfish	0	8,901		16.4	15.2	17.7
Total		31,495		68.8	65.9	72.0

Table 112 - FY 2016 QCM E stock-level catch and revenue predictions with 5% and 95% confidence intervals for FY 2016 sector sub-ACLs with industry funded ASM coverage (nominal dollars).

WITH ASM (37%)						
	Sub-ACL	**Catch**	**Utilization**	**Revenue**	**p5 Revenue**	**p95 Revenue**
Redfish	9,471	7,076	75%	8.5	7.7	9.3
GB Haddock West	34,156	4,445	13%	9.5	8.5	10.7
Pollock	17,705	3,771	21%	9.7	9.1	10.3
White Hake	3,434	1,801	52%	5.8	5.4	6.2
GB Haddock East	17,053	1,533	9%	3.2	2.7	3.7
Plaice	1,160	927	80%	3.7	3.4	4.0
GB Winter Flounder	584	502	86%	2.7	2.2	3.1
GB Cod West	550	547	100%	2.3	2.3	2.4
SNE Winter Flounder	514	355	69%	1.5	1.2	1.8
Witch Flounder	304	283	93%	1.5	1.4	1.6
GOM Cod	273	268	98%	1.2	1.1	1.2
GOM Haddock	2,385	367	15%	1.1	1.0	1.2
CC/GOM Yellowtail Flounder	325	169	52%	0.4	0.4	0.5
SNE/MA Yellowtail Flounder	145	137	95%	0.4	0.3	0.4
GOM Winter Flounder	604	85	14%	0.3	0.3	0.4
Halibut	0	46		0.3	0.3	0.3
GB Yellowtail Flounder	207	22	11%	0.1	0.0	0.1
GB Cod East	45	34	77%	0.1	0.1	0.2
Northern Windowpane	0	78		0.0	0.0	0.0
Ocean Pout	0	28		0.0	0.0	0.0
Southern Windowpane	0	67		0.0	0.0	0.0
Wolffish	0	17		0.0	0.0	0.0
Non groundfish	0	8,986		16.5	15.3	17.9
Total		31,546		68.8	66.1	71.6

Table 113 - Port-level QCM gross revenue predictions, groundfish revenues only, with 5% and 95% confidence intervals (nominal dollars).

	QCM A - FY15 (FW53 – no ASM)			QCM B - No Action (with ASM of 37%)			QCM D - WITH ASM (10%)			QCM E - WITH ASM (37%)			QCM C - No ASM		
	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev
Connecticut	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Massachusetts	41.1	36.5	46	2.5	0.2	11.2	38.7	34.7	42.9	38.7	34.6	42.6	38.9	35.1	43.1
Boston	*12.9*	*11.3*	*14.7*	1.1	0.1	4.5	16.9	15.3	18.4	16.8	15.3	18.3	16.9	15.6	18.6
Gloucester	*8.2*	*7.2*	*9.3*	0.5	0.0	2.4	10.6	9.6	11.8	10.7	9.7	11.7	10.5	9.5	11.5
New Bedford	*16.9*	*15.5*	*18.2*	0.7	0.1	3.6	9.0	8.1	10.1	8.9	7.9	9.9	9.3	8.3	10.2
Maine	12.9	11	14.6	0.6	0.0	3.0	11.1	9.6	12.7	11.0	9.5	12.5	10.9	9.6	12.2
Portland	*11.4*	*9.8*	*13*	0.5	0.0	2.6	9.8	8.5	11.3	9.7	8.4	11.0	9.8	8.6	10.9
New Hampshire	1.3	1.1	1.5	0.1	0.0	0.6	1.5	1.2	1.8	1.5	1.2	1.8	1.4	1.2	1.7
New Jersey	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New York	1	0.7	1.3	0.0	0.0	0.1	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.3
Rhode Island	2.6	2.1	3	0.1	0.0	0.3	0.9	0.7	1.1	0.9	0.7	1.2	1.0	0.7	1.2
Point Judith	*1.9*	*1.7*	*2.2*	0.1	0.0	0.3	0.8	0.6	0.9	0.8	0.6	1.0	0.8	0.6	1.0
Other Northeast	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	59.1	51.5	66.7	3.2	0.4	14.2	52.4	50.2	54.8	52.3	50.2	54.6	52.4	50.2	54.5

Table 114 - Vessel size category-level QCM gross revenue predictions, groundfish revenues only, with 5% and 95% confidence intervals (nominal dollars).

	QCM A - FY15 (FW53 – no ASM)			QCM B - No Action (with ASM of 37%)			QCM D - With ASM (10%)			QCM E - With ASM (37%)			QCM C - No ASM		
Length class	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev
<30'	0	0	0	0.0	0.0	0.1	0.2	0.1	0.3	0.2	0.1	0.3	0.2	0.1	0.3
30'to<50'	4.5	4.1	4.9	0.3	0.0	1.5	4.6	4.1	5.0	4.6	4.2	5.1	4.4	4.0	4.8
50'to<75'	17.3	15.8	18.6	1.4	0.1	5.5	20.5	18.9	22.0	20.4	19.0	21.9	20.5	18.9	21.9
75'+	37.1	34.1	39.9	1.6	0.2	6.9	27.2	25.4	29.1	27.2	25.2	29.0	27.4	25.6	29.3
TOTAL	59.1	54.1	63.7	3.2	0.4	14.2	52.4	50.2	54.8	52.3	50.2	54.6	52.4	50.2	54.5

Figure 30 – Per-pound ASM 'cost' estimates from simulation results.

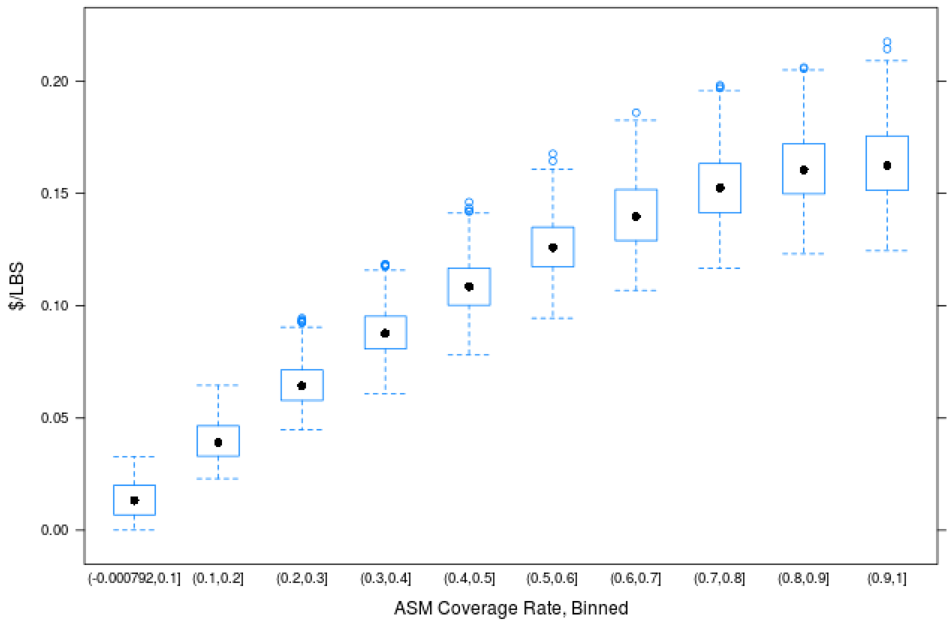
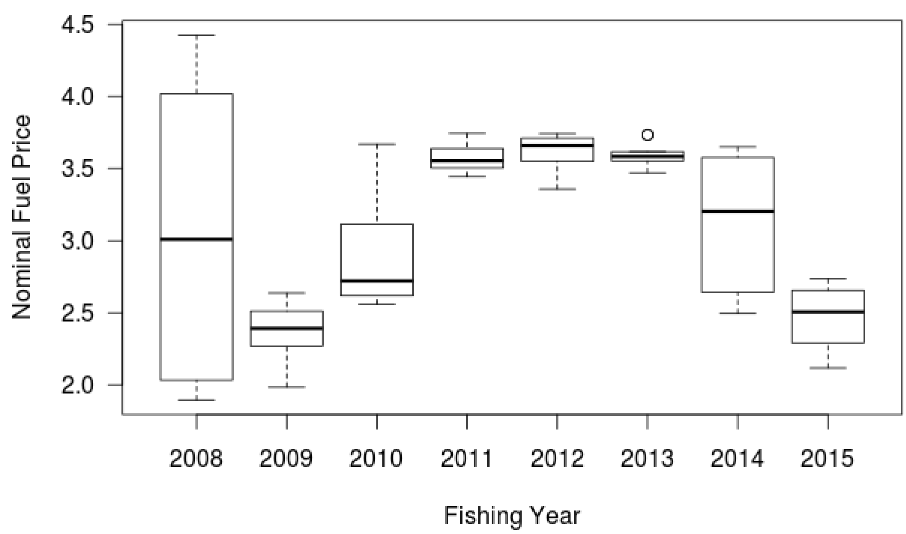
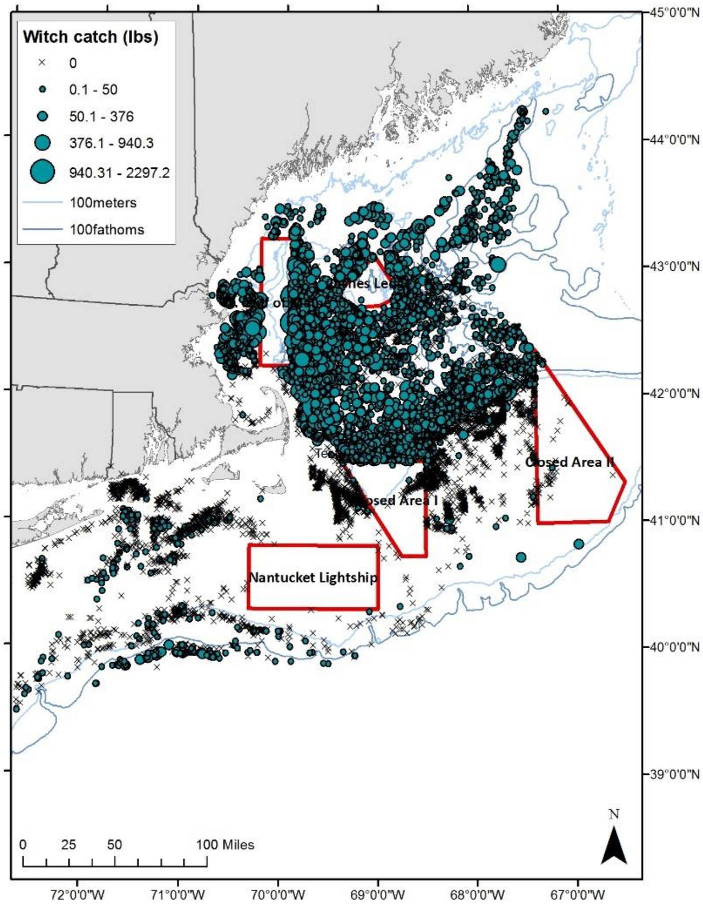


Figure 31 - Nominal fuel prices (dollars) for November, 2008-2015



Witch Flounder Distribution - While the QCM does not predict that witch flounder sub-ACLs (304mt, 361mt, 418mt) will be the most constraining (GB cod and GOM cod, see Table 101, Table 102, and Table 111), if the stock is unavoidable during the prosecution of the groundfish fishery, the fleet may in fact utilize more witch flounder ACE than the QCM is predicting. Therefore, the presence and absence of witch flounder catches and landings at the trip and haul level using observer and ASM data gathered on sector trips using large mesh trawl gear during calendar year (CY) 2014 was examined. Figure 32 depicts the presence and absence of witch flounder in large mesh hauls during CY2014, with "x" noting the absence of any witch flounder in a haul (kept or discarded), and graduated circles illustrating the relative catch (lbs) on the haul. Based on the number of positive tows in Figure 32, witch flounder appears to be broadly distributed throughout the GOM and along the northern edge of GB. While witch flounder is considered a unit stock for management purposes, its presence is patchier in sector hauls in SNE and across the southern flank of GB as shown by the number of hauls with zero catch of witch flounder in this area.

Figure 32 - Witch flounder catch in pounds (end haul location) by large mesh otter trawl on sector trips in CY2014.



7.4.1 Updates to Status Determination Criteria and Annual Catch Limits

7.4.1.1 Revised Status Determination Criteria

7.4.1.1.1 Option 1: No Action

Under Option 1, there would be no revisions to the Status Determination Criteria (SDC) of groundfish stocks (see Table 1 in Alternatives under Consideration, pp.14) and the numerical estimates based of the SDC would not change (see Table 2 in Alternatives under Consideration, pp. 15).

If Option 1 is selected, there would not be any immediate economic impacts to the groundfish fishery or any other fishery, as the current methodology used for setting ABCs for groundfish stocks would not be altered. The long term consequences of Option 1 would be that biomass targets would be based on outdated information, and this would not constitute the use of best scientific information as stipulated by the Magnuson-Stevens Act (101-627, 104-297). By not incorporating the new numerical estimates of the SDC from the 2015 Operational Stock Assessments, overfishing of some groundfish stocks under rebuilding plans would be more likely to occur during FY 2016. While a greater harvest of these stocks would yield positive short term economic impacts, overfishing of these stocks would compromise their rebuilding potential and the long term revenue that could be generated from these stocks.

7.4.1.1.2 Option 2: Revised Status Determination Criteria (*Preferred Alternative*)

Under Option 2, the numerical estimates of the SDC for all groundfish stocks would be updated (Table 4 in Alternatives under Consideration, pp.18). Option 2 would reflect the most recent 2015 operational assessments and would be based
on the best available science, consistent with the M-S Act. Given that this updated information should provide more accurate estimates of the Maximum Sustainable Yield (MSY) and the fishing mortality (F) at MSY for groundfish stocks, the long term economic impacts of Option 2 would expected to be positive. However, as there is always some degree of uncertainty surrounding Biological Reference Point estimates, a definitive statement on long term impacts cannot be made.

7.4.1.2 Annual Catch Limits

7.4.1.2.1 Option 1: No Action

If Option 1 is selected, the FY2016 Annual Catch Limits (ACLs) for GOM cod, GOM haddock, GB winter flounder, GOM winter flounder, and pollock would be unchanged from the FW53 specifications. For all other groundfish stocks, ACLs were not specified in FY2016 through the FW53 specifications and the default ACLs for these stocks would be set at 35% of the FY2015 value. These default ACLs would expire on July 31st, 2016.

Economic impacts on the commercial groundfish fishery

Option 1 would have negative impacts to the commercial groundfish fishery relative to FY2015 and Option 2. Groundfish vessels would only have three months (May, June, and July) to operate in FY2016 before the default ACLs expire. Once the default specifications expire, there would be no ACL for a number of unit groundfish stocks, and the groundfish fishery would be closed for the remainder of the fishing year.

Based on the QCM results under No Action ACLs for FY16 (with industry-funded ASM at 37%), predicted revenue from groundfish trips is $4.5 million, a 94.1% decline from the FY15 prediction in FW53. Groundfish revenue from groundfish trips is predicted to be $3.2 million, a 94.6% decline from the FY15 prediction.

The QCM prediction for No Action ACLs assumes industry-funded ASM in FY16. The effect of No Action on gross revenues without industry-funded ASM was not modeled and is unknown. However, ASM costs would not be borne by the industry.

Economic impacts on the recreational groundfish fishery

Option 1 would have neutral impacts to the recreational fishery relative to FY 2015. The recreational groundfish sub-ACLs for GOM cod and GOM haddock would be unchanged from those specified in FW53.

Option 1 would likely have negative impacts to the recreational fishery relative to Option 2, as the recreational sub-ACLs for both GOM cod and GOM haddock in FY 2016 would be unchanged from those in FY 2015. Option 2 would increase the recreational sub-ACLs for both stocks. The higher sub ACLs under Option 2 should allow for more relaxed regulations while still keeping GOM cod and GOM haddock mortality in the recreational fishery below the sub-ACL.

Economic impacts on other fisheries

Sea scallop fishery

Under No Action, a scallop fishery sub-ACL for SNE/MA yellowtail flounder would not be specified. While this would not prevent the scallop fishery from fishing in FY 2016, it is not clear if the absence of a sub-ACL would be treated as if the sub-ACL was zero. If this were to be the case, then any catches of SNE/MA yellowtail flounder would lead to scallop fishery AMs being implemented in FY 2017 and/or later years. Such a scenario would result in large reductions in scallop fishery revenues relative to Option 2. If however the scallop fishery catches of SNE/MA yellowtail flounder would not trigger AMs, Option 1 might allow for greater scallop fishery revenues than would be the case if AMs are triggered using the ACLs of Option 2. As it is not clear how the absence of a sub-ACL for SNE/MA yellowtail flounder would be treated, the direction and magnitude of the Option 1 impacts to the scallop fishery are unknown.

GB yellowtail flounder AMs were developed for the sea scallop fishery in Amendment 15 to the Atlantic Sea Scallop FMP, and later modified in FW23. The scallop fishery is subject to an AM in the following fishing year if scallop vessels participating in either open-area or access-area trips exceed their sub-allocation of GB yellowtail flounder, and either the total GB yellowtail flounder ACL is exceeded or the scallop fishery exceeds its ACL by 50 percent or more. The length of the AM area closures is determined by the overage percent. If the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement. Under Option 1, the sea scallop fishery sub-ACL for GB yellowtail flounder is expected to increase from 38 mt in FY2015 to 55 mt in FY 2016, an increase of 44.7%. Actual catches were 37.5 mt in FY 2013, 59 mt in FY2014, and are projected to be as high as 49.6 mt in FY2015. Accountability measures were not triggered in FYs 2013 or 2014. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (24.5% in FY14; 36.1% in FY13; 58.5% in FY12) suggests that the total ACL is unlikely to be exceeded in FY 2016, even if the sub-ACL in the scallop fishery is. This means that the likely threshold of GB yellowtail catch to trigger scallop fishery AMs would be 82.5 mt (150% of 55 mt) under Option 1. Therefore, the scallop fishery would not be functionally limited by a sub-ACL of 55 mt in FY2016.

Atlantic herring fishery

Option 1 would have negative impacts to the Atlantic herring fishery relative to FY 2015 and Option 2. The sub-ACL for GB haddock in the Atlantic herring fishery would be decreased to 79 mt, 35% of the FY 2015 value of 227 mt. The FY 2015 sub-ACL for GB haddock was reached by the Atlantic herring fishery, triggering accountability measures (AMs) on October 22, 2015. Under Option 1, AMs will be triggered even earlier during FY 2016 if incidental catch rates of GB haddock in the herring fishery are similar to those of FY 2015.

Small mesh fishery

Option 1 would have neutral impacts to the small mesh fishery. The sub-ACL for GB yellowtail flounder in the small mesh fishery would remain unchanged (7 mt) from the FW53 specifications.

Option 1 would have positive impacts to the small mesh fishery relative to Option 2. Option 2 would decrease the sub-ACL for GB yellowtail flounder from 7mt to 5mt in FY 2016.

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

- *Option 2 – Preferred Alternative, including:*
  - *Sub-Option 1A – SNE/MA Yellowtail Flounder Scallop sub-ACL at 90% of Estimated Scallop Fishery Catch (Preferred Sub-Option)*
  - *Sub-Option 2B –Witch Flounder ABC of 460 mt (Preferred Sub-Option)*

Economic impacts relative to No Action
The economic impacts of Option 2 would be positive relative to No Action. The QCM predicts total revenue from groundfish trips to be $69.0 million in FY16 in the absence of industry-funded ASM and $68.8 million with ASM funded by industry at a 10% coverage rate. These predictions are, respectively, $64.5 million and $64.3 million greater than the No Action prediction of $4.5 million.

In terms of groundfish revenue on groundfish trips, the QCM predicts revenue of $52.4 million in FY16 in the absence of industry-funded ASM and also with ASM funded by industry at a 10% coverage rate. These predictions are $49.2 million greater than the No Action prediction of $3.2 million.

The QCM prediction for No Action ACLs assumes industry-funded ASM in FY16. The effect of No Action on gross revenues without industry-funded ASM was not modeled and is unknown. However, ASM costs would not be borne by the industry.

Economic impacts on the Sector-based commercial fishery relative to FY 2015

There are a number of other alternatives within this action that would result in a wide range of ASM coverage levels. All of these different coverage levels are not evaluated within the QCM. Rather, two ASM coverage level rates (10% and 37%) were selected. The total cost of these other coverage levels are evaluated, and will be discussed, independently of the QCM in later sections of this document.

Under Option 2, predicted gross revenue for sector members on groundfish trips in FY 2016 is $68.8 million, assuming industry-funded ASM coverage at 10%. This value represents a 9.8% decline from the FW53 prediction for FY 2015 of $76.3 million. Predicted groundfish revenue in FY 2016, with 10% ASM coverage, is $52.4 million, representing an 11.5% decline from the FY 2015 prediction of $59.2 million.

In terms of costs, ASM is predicted to cost sectors $1.3 million in FY 2016 at a coverage rate of 10%. This value represents 22.6% of the predicted variable costs to sectors in FY 2016 of $25.7 million, though the QCM has underestimated total effort (and costs) in previous FWs. One major benefit to sectors in FY 2016 vs. earlier fishing years is a sharp decrease in fuel prices (Figure 31). Trips costs are predicted to be around $5 million lower than realized FY 2014 values, primarily due to fuel prices changes.

At the groundfish stock-level, FY 2016 is expected to present unprecedented challenges to the fishery in terms of avoiding constraining stocks. Table 7 shows that GB cod, witch flounder, GOM cod, and SNE/MA yellowtail flounder are all predicted to have utilization rates above 90%. Behavioral modifications will have to be made by captains in order to avoid triggering a closure of a broad stock area or the entire fishery. The fact that these four stocks have recently had among the highest ex-vessel prices of all groundfish stocks also contributes to predicted fishery revenue decreases in FY 2016.
The impacts to the sector-based fishery are predicted to be distributed non-uniformly across ports and vessel size classes. Southern New England ports are expected to be negatively impacted in a significant way with New Bedford predicted to see revenues fall from $16.9 million in FY15 to $9.0 million in FY16

(a 47% decline), assuming industry-funded ASM at 10% coverage. Point Judith is predicted to see revenues fall from $1.9 million in FY15 to $0.8 million in FY16, a 57.9% decline. Boston and Gloucester, meanwhile, are predicted to have significant revenue increases to $16.9 million (a 31% increase) and $10.6 million (a 29% increase) respectively. Across vessel size classes, 75'+ vessels are predicted to see revenue decreases of $9.9 million to $27.2 million (a 26.7% decrease) assuming industry-funded ASM at 10% coverage. Vessels in the 50' to <75' range are predicted to see revenue increases of $3.2 million relative to FY15, an increase of 18.5%.

Economic impacts on the Common Pool fishery relative to FY 2015

The QCM incorporated only sector vessels in the analysis, as they make up the vast majority of groundfish landings and revenue. As the sector-based fishery incorporates all the same fishing vessel types and port locations as in the common pool, it is expected that most vessels in the common pool groundfish fishery would incur economic losses relative to FY 2015. However, because there would be an extremely limited groundfish fishery under Option 1, the economic impacts of Option 2 to common pool vessels would be positive compared to No Action.

Supplemental information for economic impacts to commercial groundfish fishery

Table 1 provides quota changes from FY 2015 to FY 2016 for commercial groundfish fishery sub-ACLs for allocated stocks, followed by a list of potentially constraining stocks.

Table 115 - Commercial groundfish sub-ACLs for FY 2015 and FY 2016 under Option 2 in mt.

Stock	FY 2015 commercial groundfish sub-ACL	FY 2016 commercial groundfish sub-ACL	% Change
GB Cod	1,787	608	-66.0%
GOM Cod	207	280	35.3%
GB Haddock	21,759	51,667	137.5%
GOM Haddock	958	2,416	152.2%
GB Yellowtail Flounder	195	211	8.2%
SNE/MA Yellowtail Flounder (90%, Option 1A) *Preferred Alternative*	557	189	-66%
SNE/MA Yellowtail Flounder (100%, Option 1B)	557	184	-67%
CC/GOM Yellowtail Flounder	458	341	-25.5%
Plaice	1,408	1,183	-16.0%
Witch Flounder (ABC=399)	610	312	-49.9%
Witch Flounder (ABC=460) *Preferred Alternative*	610	370	-39.3%
Witch Flounder (ABC=500)	610	408	-33.1%
GB Winter Flounder	1,891	590	-68.8%
GOM Winter Flounder	392	639	63.0%
SNE/MA Winter Flounder	1,306	585	-55.2%
Redfish	11,034	9,526	-13.7%
White Hake	4,343	3,459	-20.4%
Pollock	13,720	17,817	29.9%

In FW53, the QCM predicted sector groundfish revenue of $59 million in FY 2015 from the implementation of new ACLs and GOM cod protection measures. Based on the number of stocks that would have large ACL reductions under Option 2 (Table 115), predicted revenue in FY 2016 for the sector-based fishery is likely to be less than $59 million. For reference, the most recent fishing year for which revenue data is finalized is FY 2013, in which nominal sector groundfish revenue was $58 million and nominal common pool groundfish revenue was $1 million (Murphy et al. 2015). The ACL reductions under Option 2 for the stocks listed below may particularly cause negative impacts to the groundfish fishery in FY 2016 given recent high utilization rates[21] and relatively high ex-vessel prices[22] for these stocks:

GB Cod

- Utilization rates of 59.8% in FY 2012, 87% in FY 2013, and 78.4% in FY 2014.
- As of January 19, 2016, catch of GB cod during FY 2015 is 933 mt, already well in excess of the proposed commercial groundfish sub-ACL of 608mt for FY 2016.
- Ex-vessel price for cod in CY 2015: **$2.24**

SNE/MA Yellowtail Flounder

- Utilization rates of 60.9% in FY 2012, 63.7% in FY 2013, 71.0% in FY 2014.
- As of January 19, 2016, catch of SNE yellowtail flounder during FY 2015 is 112 mt, just 77 mt short of the proposed commercial groundfish sub-ACL of 189 mt for FY 2016.
- Ex-vessel price for yellowtail flounder in CY 2015: **$1.26**

Witch Flounder (2016 ABC of 394mt to be revisited at SSC meeting in January 2016)

- Utilization rates of 67.9% in FY 2012, 105.3% in FY 2013, and 84.5% in FY 2014
- As of January 19, 2016, catch of witch flounder during FY 2015 is 329 mt, already in excess of the proposed commercial groundfish sub-ACL of 361 mt for FY 2016.
- Ex-vessel price for witch flounder in CY 2015: **$2.56**

GB Winter Flounder

- Utilization rates of 57.0% in FY 2012, 48.8% in FY 2013, 34.0% in FY 2014
- As of January 19, 2016, catch of GB winter flounder during FY 2015 is 840 mt, already in excess of the proposed commercial groundfish sub-ACL of 608mt for FY 2016.

[21] Utilization rates from NOAA Fisheries Northeast Multispecies (Groundfish) Monitoring Reports http://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/nemultispecies.html (Accessed November 17, 2015)
[22] Ex-vessel prices from dealer data within NEFSC Commercial Fisheries Database System (Accessed January 26, 2015)

- Ex-vessel price for winter flounder in CY 2015: **$2.10**

SNE Winter Flounder

- Utilization rates of 35.0% in FY 2012, 65.2% in FY 2013, 45.1% in FY 2014
- As of January, 19, 2016, catch of SNE winter flounder during FY 2015 is 570 mt, just 15 mt short of the proposed commercial groundfish sub-ACL of 585 mt for FY 2016
- Ex-vessel price for winter flounder in CY 2015: **$2.10**

Economic impacts on the Recreational fishery relative to FY 2015

Option 2 would likely result in positive impacts to the recreational fishery. Option 2 would increase the recreational sub-ACLs for GOM haddock and GOM cod in FY 2016. A higher sub-ACL for GOM haddock should result in relaxed regulations from the bag limit of 3 in FY 2015 and increase recreational fishing effort. A higher sub-ACL for GOM cod could only result in a bag limit >0 if Option 2 is selected in Section 4.4.3.3. Further economic impacts will be discussed in that section.

Overall, Option 2 would be expected to have a positive economic impact compared to No Action.

Economic impacts on other fisheries

Sea scallop fishery

Under Option 2, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder is expected to decrease from 66 mt in FY2015 to 32 mt in FY2016, a decrease of 48.5%. Actual catches were 48.6 mt in FY2013, 63 mt in FY 2014, and are projected to be 54 mt in FY2015. Accountability measures were not triggered in FYs 2013 and 2014 and are not projected to be triggered in FY 2015. With a sub-ACL of 31 mt in FY 2016 and catch projections in FY 2015 and actual catches in FY 2014 that exceed 46.5 mt (150% of 31 mt), there is a strong possibility that accountability measures will be triggered. Should accountability measures be triggered for SNE/MA yellowtail flounder in the scallop fishery, then the activity of scallop vessels would be curtailed and revenues from scalloping would be reduced. The extent of revenue reduction from the presence of AMs, which would be implemented in FY 2017, is uncertain at this time.

Under Option 2, the sea scallop fishery sub-ACL for SNE/MA windowpane flounder is expected to increase from 183 mt in FY2015 to 209 mt in FY2016, an increase of 14.2%. Actual catches were 129.1 mt in FY 2013, 136 mt in FY 2014, and were projected to be 134 mt in FY2015. As of November 2015, catch was 139 mt, though it is not expected that catch will exceed 183 mt (see Appendix I). Given these recent conditions, it is not likely that the scallop fishery would be functionally limited by a SNE/MA windowpane flounder sub-ACL of 209 mt in FY2016.

GB yellowtail flounder AMs were developed for the sea scallop fishery in Amendment 15 to the Atlantic Sea Scallop FMP, and later modified in FW23. The scallop fishery is subject to an AM in the following fishing year if scallop vessels participating in either open- area or access-area trips exceed their sub-allocation of GB yellowtail flounder, and either the total GB yellowtail flounder ACL is exceeded or the scallop fishery exceeds its ACL by 50 percent or more. The length of the AM area closures is determined by the overage percent. If the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement.

Under Option 2, the sea scallop fishery sub-ACL for GB yellowtail flounder is expected to increase from 38 mt in FY2015 to 42 mt in FY2016, an increase of 10.5%. Actual catches were 37.5 mt in FY 2013, 59 mt in FY2014, and are projected to be as high as 49.6 mt in FY2015. Accountability measures were not triggered in FYs 2013 and 2014 and are not projected to be triggered in FY 2015. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (24.5% in FY14; 36.1% in FY13; 58.5% in FY12) suggests that the total ACL is unlikely to be exceeded in FY 2016, even if the sub-ACL in the scallop fishery is. This means that the likely threshold of GB yellowtail flounder catch to trigger scallop fishery AMs would be 63 mt (150% of 55 mt) under Option 2. The projected bycatch of GB yellowtail flounder bycatch by the scallop in FY 2016 is between 27.9 and 49.6mt (see Appendix I). Therefore, while the sub-ACL of 42mt may be exceeded, the likely threshold of 63mt to trigger AMs is not expected to be reached. If GB yellowtail flounder bycatch does exceed the projections, the scallop fishery could be negatively impacted by AMs.

Atlantic herring fishery

Option 2 would have positive impacts on the Atlantic herring fishery relative to No Action and FY 2015. The sub-ACLs for GB haddock and GOM haddock would be increased from FY 2015 under Option 2. The GB haddock sub-ACL would be increased from 227mt to 521mt and the GOM haddock sub-ACL would be increased from 14mt to 34mt. These increased sub-ACLs should provide a better opportunity for the Atlantic herring fishery to avoid triggering AMs, which the herring fishery is operating under for exceeding the sub-ACL for GB haddock in-season from October 22, 2015 until the end of the 2015 groundfish fishing year. These AMs implemented a 2,000 lb. possession limit for most of the GB stock area, resulting in revenue decreases for the Atlantic herring fishery.

To estimate the loss in revenue from the FY 2015 AMs, average annual Atlantic herring revenue from herring trips to statistical areas currently under AMs (521, 522, 525, 561, and 562) for the months of November-April during FYs 2011-2014 was calculated. Table 116 shows that average herring revenue from these stat areas during this six month duration is nearly $2,000,000. The average volume of herring landings on the considered trips was slightly over 360,000 pounds (16,664,386/46), 180 times the 2,000 lb. legal possession limit under the AMs.

Table 116 - Atlantic herring trips, landings, and revenue from statistical reporting areas 521, 522, 525, 561, or 652 from November through April during groundfish FY 2011 – 2014. Trip locations from VTRs.

Groundfish Fishing Year	# of Herring Trips (In stat areas 521, 522, 525, 561, or 562 during Nov-Apr)	Herring Landed	Herring Revenue (2010 $)
2011	27	10,320,385	$1,112,396
2012	43	11,934,138	$1,498,469
2013	69	27,199,795	$2,859,290
2014	38	16,283,224	$1,731,738
Avg. 2011-2014	44	16,434,386	$1,800,473

The AMs, in place to limit incidental catch of GB haddock in FY 2015, likely offer no long term economic benefit to the groundfish fishery at this point. The GB haddock stock is well above B_{MSY} and utilization rates have been low in recent fishing years. During May-October 2015, incidental catch of GB haddock by the Atlantic herring fishery totaled 291 mt. This number is more or less insignificant when considering the commercial groundfish sub-ACL for GB haddock is nearly 22,000 and utilization rates in recent fishing years have been well below 50%.

Small mesh fishery

Option 2 would have negative impacts on the small mesh fishery relative to No Action. The sub-ACL for GB yellowtail flounder in the small mesh fishery would be decreased from the FW53 specifications from 7mt to 5mt. Under Option 2, the sub-ACL in FY 2016 would be the same as the 2015 value (5 mt). While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage.

7.4.2 Fishery Program Administration

7.4.2.1 Implementation of an Additional Sector

7.4.2.1.1 Option 1: No Action

The economic impacts of Option 1 would be neutral in that status quo would be retained, and there would not be any additional sectors added to the roster at the start of FY 2016. However, relative to Option 2, Option 1 would likely have negative economic impacts. Option 1 would not offer the same flexibility as Option 2 for sector management to adapt to new conditions in the groundfish fishery.

7.4.2.1.2 Option 2: Implement a New Sector for FY 2016 *(Preferred Alternative)*

The economic impacts of Option 2 would likely be positive relative to No Action. Since the widespread implementation of sector management through Amendment 16 to the Groundfish FMP, the limited access groundfish fleet and fishery managers have gained experience of how the fishery operates under the current management regime. It is reasonable to believe that these experiences are leading to an informed decision and the implementation of a new sector at the start of FY2016 will increase the efficiency of Sustainable Harvest Sector operations.

7.4.2.2 Sector Approval Process

7.4.2.2.1 Option 1: No Action

The economic impacts of Option 1 would be neutral. The process of creating a new sector, and the associated costs of doing so, would be unchanged.

7.4.2.2.2 Option 2: Revised Process for Approving New Northeast Groundfish Sectors *(Preferred Alternative)*

The economic impacts of Option 2 would be low positive relative to No Action. Option 2 would lessen the administrative costs of approving a new sector by not requiring the proposed sector to undergo review within a Council action (framework or amendment). Additionally, by streamlining the sector approval process, sector managers would be offered more time to make an informed decision on whether or not to apply for the implementation of a new sector in the following fishing year. Any proposed sector would still be required to submit its preliminary operations plan to the Council and NMFS prior to the submission of a final operations plan to NMFS. Accordingly, Option 2 would not result in the implementation of any sector that is expected to have adverse economic impacts to the remainder of the groundfish fishery.

7.4.2.3 Modification to the Definition of the Haddock Separator Trawl

7.4.2.3.1 Option 1: No Action

The economic impacts of Option 1 would be neutral. All vessels currently operating with a Haddock Separator Trawl would not be required to replace the separator panel portion of the trawl.

7.4.2.3.2 Option 2: Revised Definition of the Haddock Separator Trawl *(Preferred Alternative)*

The economic impacts of Option 2 would be mixed relative to No Action. Option 2 would require all vessels operating with a Haddock Separator Trawl (HST) to use a separator panel of contrasting color to those sections of the net that it separates. This action would require all vessels operating under the current definition of the HST to incur the upfront cost of replacing the panel portion of the trawl.

During fishing years 2013-2015, there were 46 unique vessels that had at least one trip in which they operated with a HST, according to their Vessel Trip Report (VTR). This figure represents the estimated number of vessels for which the owner would have to pay for the cost of materials and labor associated with replacing the HST panel. The cost of panel twine is estimated to be $360 - $800 and the cost of installing the new panel is estimated to be $200 - $600, for a total estimate of $560 - $1,400 per panel. Multiplying the estimated number of vessels operating with a HST by the cost of replacing the panel results in a one-time total cost estimate to the groundfish fleet between $25,760 (46*$560) and $64,400 (46*$1,400). This estimate assumes that each vessel identified as using a HST during fishing years 2013-2015 has only one HST for which the panel must be replaced under Option 2.

The economic benefit associated with Option 2 would be in time savings to members of the Coast Guard conducting inspections and to vessels which have to delay fishing operations while inspections occur. If the value of time saved to both parties during FY 2016 and beyond exceeds the cost of replacing the HST panels, then the economic impacts of Option 2 would be positive. However, the amount of time that would be saved per inspection under Option 2 and the number of Coast Guard inspections that occur each fishing year is unknown.

7.4.3 Commercial and Recreational Fishery Measures

7.4.3.1 Groundfish Sector Monitoring Program

7.4.3.1.1 Option 1: No Action

The economic impacts of Option 1 would be neutral. The groundfish sector monitoring program would be unchanged from the performance criteria established in Amendment 16 and FW48.

Economic impacts relative to FY 2015

Option 1 would result in a higher level of ASM coverage in FY 2016 than in FY 2015. As sectors in the groundfish fishery will be responsible for funding ASM coverage throughout FY 2016, this will represent a significant cost that up to this point was not borne by the fishery. Under No Action, the total target coverage rate would be 41% in FY 2016 since monitoring of 80% of discarded pounds at CV30 at the sector/gear/stock level would be required. Assuming NEFOP coverage will be set at 4% for FY 2016, ASM target coverage rates would be 37%. The number of predicted whole days absent by sector vessels on groundfish trips during FY 2016 is predicted to be 20,000. This is based on QCM predictions of days absent not changing appreciably from FY2014 through FY2016. In FY2014 actual days absent rounded to whole days was 20,000 and so since predicted days from the QCM model are not expected to change, 20,000 whole days are assumed to be the base level of effort upon which the implications of varying levels of ASM coverage will be evaluated. At a 37% ASM coverage rate and a cost of $710 per observed seaday, the cost of ASM to sectors would be $5.3 million (20,000*.37*$710) under No Action. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate. The estimate of total ASM cost from the Quota Change Model, assuming the new quotas from FW55 and a coverage rate of 37%, is $4.5 million dollars. This figure is based on a per pound of groundfish landed cost of $0.0916 and estimated groundfish landings from the model.

The overall impacts of Option 1 cannot be determined as the economic benefits of ASM are not quantifiable at this time. Increased coverage leads to a more precise estimate of sector discards, and improved estimates of actual catch by sector vessels. However, additional precision may or may not lead to changes in available ACE to a sector (assumed discards were too high or too low), the marginal value of added precision from each percent increase in ASM coverage is unknown. Option 1 would result in higher coverage levels than in recent fishing years.

7.4.3.1.2 Option 2: Clarify Groundfish Monitoring Goals and Objectives *(Preferred Alternative)*

The economic impacts of Option 2 are expected to be neutral in relation to No Action. Option 2 alone would not change the current methods for setting target coverage levels.

7.4.3.1.3 Option 3: Clarify methods used to set sector coverage rates (*Preferred Alternative*)

- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)
- Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

Option 3A would result in a lower level of coverage relative to No Action and thereby a reduction in cost to sectors. If monitoring 80% of discarded pounds at CV30 sector/gear/stock level were to be required in FY 2016, the No Action target coverage rate would be 41% (see Appendix III,). Under Sub-Option 3A, in which this would not be a requirement, target coverage would be set at 37% and be driven by redfish. Assuming NEFOP coverage were to be set at 4% for FY 2016, ASM target coverage rates would be 33%

Under Sub-Option 3A, using the same effort assumption as in the No Action alternative, an ASM coverage rate of 33% would result in ASM costs of $4.7 million (20,000*.33*$710). Sub-Option 3A would yield in an estimated $0.6 million decrease in ASM costs to groundfish sectors during FY 2016 relative to No Action.

Option 3B would result in a lower level of coverage relative to Sub-Option 3A and the No Action Alternative, thereby resulting in a reduction in cost to sectors. Under Sub-Option 3A, in which only one year of CV data (FY 2014) would be used to set a total coverage target, the ASM coverage rate would be set at 33%, assuming NEFOP coverage were to be set at 4%. Appendix IV in PDT memo to GF committee shows that has more years of data are used, the average required coverage to achieve CV30 across all stocks declines. With three years of data, the average falls to 17% (based on redfish); with five years of data, the average falls to 12% (based on GB winter flounder). Option 3B would result in a lower coverage rate and a greater reduction in costs to sectors during FY 2016 than Option 5, which would establish performance criteria for meeting the CV30 standard.

Assuming NEFOP coverage of 4% for FY 2016, the ASM target coverage would be 14% when using 3 years of data and 8% when using 5 years of data. Assuming 20,000 days absent, and a cost of $710 per observed seaday, the cost of ASM to sectors would be $1.8 million (20,000*.13*$710) using the 3 year approach and $1.1 million using the 5 year approach (20,000*.08*710) under Sub-Option 3B. The 3 year approach would represent savings of $3.5 million relative to No Action ($5.3 million) and $2.9 million relative to Sub-Option 3A ($4.7 million). The 5 year approach would represent savings of $4.2 million relative to No Action and $3.6 million relative to Sub-Option 3A. The $710 per observed seaday is based on NMFS cost estimates for the ASM program. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate.

The overall impacts of Option 3 relative to No Action cannot be determined, as the benefits of ASM are not quantifiable at this time. While increased coverage leads to a better estimate of discards and improved stock estimates, the marginal value of each % increase in coverage is unknown.

7.4.3.1.4 Option 4: Remove ASM coverage requirements for a sub-set of sector gillnet trips

- Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear (*Preferred Alternative*)
- Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries

During FYs 2012-2014, there were 343 sector trips carrying an ASM observer and fishing strictly with gillnets of mesh size 10” or greater in broad stock areas 2 and 4 (Table 117). At an annual rate, the number of trips is 114. This is the estimated number of sector trips fishing exclusively with gillnets of mesh size 10” or greater that will occur during FY 2016 and will be not be subject to ASM coverage. Based on the average trip length for gillnet vessels during FY 2014 (0.8 days), the number of seadays from these 114 trips is estimated to be 91. The monitoring cost of each observed seaday is $710, meaning Option 4A would result in cost savings of $64,610 (710*91) compared to Option 1 for the portion of the groundfish fleet fishing with ELM gillnets during FY 2016. However, if this observer coverage were to get shifted onto other components of the groundfish fleet, then Sub-Option 4A would result in no overall cost savings.

Table 117 - Number of ASM observed trips fishing strictly with ELM (10"+) gillnets in BSAs 2 & 4, FY 2012 - FY 2014.

ASM only trips	Fishing Year			
BSA	2012	2013	2014	Grand Total
IGB - BSA 2	37	41	83	161
SNE - BSA 4	127	13	42	182
Grand Total	164	54	125	343

The number of sector trips to the three dogfish exemptions specified in Alternative 4.3.1.4.2 is given in Table 12. While only gillnet trips to these exemption area would not be required to adhere to ASM coverage requirements, trawl gear is allowed in the Nantucket Shoals Dogfish Exemption Area and longline and handgear is allowed in the Cape Cod Spiny Dogfish Exemption Area. Table 118 includes all gear types, and so the number of sector trips that would have been impacted under Sub-Option 4B during FYs 2012-2015 should be considered an overestimate.

Table 119, which sums up sector trips across the three exemption areas, therefore would also be an overestimate of the number of sector trips that would have been impacted under Sub-Option 4B. Nevertheless, the 469 average ASM trips to these exemption areas per fishing year are used as a proxy for FY 2016 effort. Based on the average trip length for gillnet vessels during FY 2014 (0.8 days), the number of seadays from these 469 trips is estimated to be 375 in FY 2016. The monitoring cost of each observed seaday is $710, meaning Sub-Option 4B would result in cost savings of $266,250 ($710 cost/seaday*375 seadays) compared to Option 1 for the portion of the groundfish fleet fishing with ELM gillnets in the dogfish exemption areas during FY 2016. Again, this figure is likely an overestimate, particularly if sectors are able to negotiate lower rates for ASM with service providers. If observer coverage were to get shifted onto other components of the groundfish fleet, then Sub-Option 4B would result in no overall cost savings to sectors.

Table 118 - Total trips and sector trips fishing in the dogfish exemption areas specified in Alternative 4.3.1.4.2, FY 2012 - FY 2015.

Nantucket Shoals Dogfish Exemption Area

EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIPS	SMALL MESH TRIPS	LOA TRIPS
Nantucket Shoals	2015	1110	1063	0	0
Nantucket Shoals	2014	1069	1034	4	0
Nantucket Shoals	2013	965	919	3	0
Nantucket Shoals	2012	1231	1215	3	0

Cape Cod Spiny Dogfish Exemption Eastern Area

EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIPS
Cape Cod Eastern Area	2015	1023	647
Cape Cod Eastern Area	2014	1598	573
Cape Cod Eastern Area	2013	1239	517
Cape Cod Eastern Area	2012	1846	1227

SNE Dogfish Gillnet Exempted Fishery

EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIP
SNE Gillnet	2015	790	265
SNE Gillnet	2014	1766	418
SNE Gillnet	2013	1550	262
SNE Gillnet	2012	1987	381

*Trips based on VTR reported coordinates and exclude state, party/charter, and research trips
Data Source: DMIS, Greater Atlantic Regional Fisheries Office

Table 119 - Total sector trips to the three dogfish exemption areas specified in Alternative 4.3.1.4.2, FY 2012 - FY 2015.

Fishing Year	Sector Trips	Number of ASM Trips, assuming 22% coverage
2015	1,975	435
2014	2,025	446
2013	1,698	374
2012	2,823	621
Avg. 2012-2015	2,130	469

7.4.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

Economic impacts relative to No Action

Option 5 would result in a lower level of ASM coverage relative to No Action and thereby a reduction in cost to sectors. Under the Fishery Performance Criteria, redfish would be not be the driver of coverage (based on the CV 30 standard), and GOM winter flounder would drive the target observer coverage rate, which would be set at 26%. With assumed NEFOP coverage of 4%, the ASM target coverage rate would therefore be 22%.

The number of predicted whole days absent by sector vessels on groundfish trips during FY 2016 is 20,000. Under Option 5, an ASM coverage rate of 22% would result in ASM costs of $3.1 million (20,000*.22*$710). Option 5 would yield in an estimated $2.2 million decrease in ASM costs to groundfish sectors during FY 2016 relative to the No Action alternative.

Economic impacts relative to FY 2015

Option 5 would result in a target observer coverage rate of 26% during FY 2016, a 2% increase relative to the FY 2015 target of 24%. Assuming a 4% NEFOP target coverage level in FY 2016, the ASM target coverage level would be 22%. As sectors will be responsible for funding ASM coverage throughout FY 2016, this will represent a significant cost that up to this point was not borne by the fishery. As stated above, the estimated cost of ASM during FY 2016 under Option 5 would be $3.1 million.

The overall impacts of Option 5 cannot be determined as the benefits of ASM are not quantifiable at this time. While increased coverage leads to a better estimate of discards and improved stock estimates, the marginal value of each % increase in coverage is unknown.

Economic impacts of all ASM options combined (Options 2, 3A, 3B, 4A and 5 (75/10))

The combination of ASM alternatives would result in a lower level of ASM coverage relative to the No Action Alternative thereby resulting in a reduction in cost to sectors. A total coverage target of 14% is the result of combining these options. Assuming NEFOP coverage of 4% for FY 2016, the ASM target coverage would be 10%. Assuming 20,000 days absent, and a cost of $710 per observed seaday, the cost of ASM to sectors would be $1.4 million (20,000*.10*$710). This would represent cost savings of $3.9 million relative to the No Action alternative, assuming the same amount of effort with and without industry-funded ASM. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate.

The QCM predicts very similar levels of effort from the sector-based fishery with industry-funded ASM at 10% compared to without it. The estimate of total ASM cost from the Quota Change Model, assuming the new quotas from FW55 and a coverage rate of 10%, is $1.3 million dollars. This figure is based on a per pound of groundfish landed cost of $0.0273 and estimated groundfish landings from the model.

As stated above, increased coverage leads to a better estimate of discards and improved stock estimates. Conversely, low coverage levels may lead to less precise and less accurate estimates of dicards and total catch , which could lead to negative economic impacts through the premature triggering of AMs. The marginal value of each % increase in coverage is unknown.

7.4.3.2 Management Measures for U.S. Georges Bank Cod TACs

7.4.3.2.1 Option 1: No Action

The economic impacts of Option 1 would be neutral in that status quo would be retained. However, given the sizable decrease in the revised ACL for (Western) Georges Bank cod in FY2016, groundfish fishing effort on Western Georges Bank may be further constrained under Option 1 relative to Option 2. Option 1 would have negative economic impacts relative to Option 2.

7.4.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod

The economic impacts of Option 2 would be positive relative to No Action. Option 2 would provide added operational flexibility to sectors that have Eastern Georges Bank (EGB) cod ACE and are in need of Western Georges Bank (hereafter GB cod) ACE in order for its members to continue fishing on the Western portion of Georges Bank stock area. Given the sizable decreases in the revised ACL for GB cod in FY2016, the ability of sectors to convert their EGB cod ACE may be of critical importance for allowing their members to maintain fishing operations on Georges Bank throughout FY2016. In the absence of available ACE for GB cod, sector members are not permitted to fish on Inshore Georges Bank (BSA 2) or Offshore Georges Bank (BSA 3). Table 120 gives a breakdown of the highest revenue-grossing species per fishing year from sector groundfish trips within these statistical areas during FYs 2010-2014.

Table 120 – Highest average revenue-grossing species on sector groundfish trips to Georges Bank* (BSA 2 & 3) during FYs 2010-2014.

Species	Avg. Revenue (2010 $) generated per fishing year, FYs 2010-2014
Haddock	$10,462,132
Cod	$7,341,766
Winter Flounder	$6,912,095
Monkfish	$3,205,740
Pollock	$2,650,141

7.4.3.3 Modification to the Gulf of Maine Cod Protection Measures

7.4.3.3.1 Option 1: No Action

The economic impacts of Option 1 would be neutral. The Gulf of Maine Cod Protection Measures established under FW 53 to the Groundfish FMP would be unchanged. In the absence of a cod bag limit >0, the recreational fishery is still likely to experience positive impacts relative to FY 2015 if the haddock bag limit is set higher than 3. Options 2-5 in Table 121 show an increase in angler effort relative to the status quo despite a zero possession limit on cod.

7.4.3.3.2 Option 2: Change in Authority to Modify GOM Cod Recreational Possession Limits

The economic impacts of Option 2 would vary based on future management actions taken. If the Regional Administrator (RA) were to set a possession limit on GOM cod of zero for FY 2016, then Option 2 would have neutral impacts relative to No Action. If however the RA were to set a possession limit on GOM cod greater than zero, then Option 2 would yield positive impacts to the recreational fishery relative to No Action in FY 2016. The magnitude of these impacts is difficult to predict. It is unclear how many more recreational trips would be taken if there was some allowance on the possession of GOM cod in FY 2016, but simulation results under various suites of regulations indicate a non-negligible increase in the number of trips in FY 2016 with a cod bag limit of 1 (Table 121).

If the possession limit on GOM cod were to be set above zero and GOM cod mortality in FY 2016 remains below the recreational sub-ACL, then the long term impacts of Option 2 would be positive as well. If GOM cod mortality in the recreational fishery were to exceed the sub-ACL, then the long term impacts of Option 2 may be negative. Overfishing would not only jeopardize the likelihood of higher possession limits for the recreational fishery in fishing years beyond 2016, but could also negatively affect the long term harvest of the commercial fishery.

Table 121 – Recreational fishery projections for FY 2016 under 16 different management scenarios, including the RAP recommendation and Groundfish Committee recommendation; results from the bioeconomic model for GOM fisheries, NEFSC, November 25, 2015.

FY 2016 Gulf of Maine Cod and Haddock Simulation Projections

	Haddock						Cod								
Option	Had Limit	Had Size	Had Open Season	Had Kept mt (Median)	Had Release Mortality mt (Median)	Had Total Mortality mt (Median)	Cod Limit	Cod Size	Cod Open Season	Cod Kept mt (Median)	Cod Release Mortality mt (Median)	Cod Total Mortality mt (Median)	Angler Trips (Median)	% Under Had ACL (out of 100 (Simulations)	% Under Cod ACL (out of 100 (Simulations)
1 (Status Quo)	3	17"	Waves 3, 4, 6, 1	268	137	405	0		Closed	4	62	66	117,139	100	100
2	8	17"	Waves 3, 4, 6, 1	351	100	451	0		Closed	4	64	68	118,912	100	100
3	No limit	17"	Waves 3, 4, 6, 1	393	80	473	0		Closed	4	64	68	119,345	100	100
4	No limit	17"	Waves 3, 4, 5, 6, 1	494	83	577	0		Closed	5	74	79	142,410	100	100
5	No limit	17"	Waves 3, 4, 5, 6, 1, 2*	626	89	715	0		Closed	5	92	97	167,103	100	100
6	No limit	17"	Waves 3, 4, 5, 6, 1	499	84	583	1	24"	Wave 3	67	66	133	143,756	100	95
7	No limit	17"	Waves 3, 4, 5, 6, 1	496	85	581	1	24"	Wave 4	45	69	114	143,503	100	100
8	No limit	17"	Waves 3, 4, 5, 6, 1	501	85	586	1	23"	Wave 3	79	65	144	144,171	100	73
9	No limit	17"	Waves 3, 4, 5, 6, 1	497	85	582	1	23"	Wave 4	50	69	119	143,720	100	100
10	No limit	17"	Waves 3, 4, 5, 6, 1, 2*	631	90	721	1	24"	Wave 3	68	83	151	168,505	100	63
11	No limit	17"	Waves 3, 4, 5, 6, 1, 2*	629	90	719	1	24"	Wave 4	47	87	134	168,264	100	92
12	No limit	17"	Waves 3, 4, 5, 6, 1, 2*	633	90	723	1	23"	Wave 3	80	82	162	168,898	100	39
13	3	17"	Waves 3, 4, 6, 1	275	140	415	1	24"	Waves 3, 4	105	49	154	119,740	100	57
14	8	17"	Waves 3, 4, 6, 1	359	102	461	1	24"	Waves 3, 4	107	50	157	121,437	100	46
RAP Recommended	15	17"	Waves 3, 4, 5, 6, 1, 2*	610	99	709	1	24"	Wave 4	46	86	132	168,125	100	93
Committee Recommended	15	17"	Waves 3, 4, 5, 6, 1, 2*	609	98	707	1	24"	Wave 5	25	89	114	167,549	100	100

* Wave 2 open Apr 15 - 30

FY 2016 GOM haddock recreational sub-ACL = 928 mt

FY 2016 GOM cod recreational sub-ACL = 157 mt

7.5 Social Impacts

National Standard 8 (NS8) requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. Thus, continued overall access to fishery resources is a consideration, but not a guarantee that fishermen will be able to use a particular gear type, harvest a particular species of fish, fish in a particular area, or fish during a certain time of the year.

A fundamental difficulty exists in forecasting social change relative to management alternatives, since communities or other societal groups are constantly evolving in response to external factors (e.g., market conditions, technology, alternate uses of waterfront, and tourism). Certainly, management regulations influence the direction and magnitude of economic and social change, but attribution is difficult with the tools and data available. While the focus here is on the economic and social impacts of the proposed fishing regulations, external factors may also influence change, both positive and negative, in the affected communities. External factors may also lead to unanticipated consequences of a regulation, due to cumulative impacts. These factors contribute to a community's ability to adapt to new regulations.

When examining potential social impacts of management measures, it is important to consider impacts on the following: the fishing fleet (vessels grouped by fishery, primary gear type, and/or size); vessel owners and employees (captains and crew); groundfish dealers and processors; final users of groundfish; community cooperatives; fishing industry associations; cultural components of the community; and fishing families. While some management measures may have a short-term negative impact on some communities, these should be weighed against potential long-term benefits to all communities which can be derived from a sustainable groundfish fishery.

The social impact factors outlined below are used to describe the Northeast multispecies fishery, its sociocultural and community context and its participants. These factors are considered relative to the management alternatives and used as a basis for comparison between alternatives. Use of these kinds of factors in social impact assessment is based on NMFS guidance (NMFS 2007) and other texts (e.g., Burdge 1998). Longitudinal data describing these social factors region-wide and in comparable terms is limited. While this analysis does not quantify the impacts of the management alternatives relative to the social impact factors, qualitative discussion of the potential changes to the factors characterizes the likely direction and magnitude of the impacts.

The social impact factors fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.
2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.
3. The effects of the proposed action on *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities, as well as effects on the community's social structure, politics, etc.
4. The *Non-Economic Social Aspects* of the proposed action; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.
5. The *Historical Dependence on and Participation in* the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007).

Surveys of the Socio-Economic Aspects of Commercial Fishing Vessel Owners and Crew in New England

In addition to insights and information from prior research on groundfish fisheries, the economic impact analysis provided for this framework, and qualitative assessments of public comment sections at Council meetings, this social impact analysis will also provide analysis of data from the Surveys on the Socio-Economic Aspects of Commercial Fishing Vessel Owners and Crew in New England and the mid-Atlantic (SEAS) conducted by the Social Science Branch at the Northeast Fisheries Science Center.

The crew survey began in October, 2012 and concluded in September, 2013. The survey was administered via face to face interviews to a randomly selected sample of 1,300 crew members. The interviews were conducted at several selected fishing ports from the region. By the closing of the survey, 400 interviews were completed.

The Survey on the Socio-Economic Aspects of Commercial Fishing Vessel Owners in New England and the Mid-Atlantic is currently underway. Surveys were mailed to 1,400 vessel owners on September 13, 2013. One-hundred and fifty-seven surveys (one-hundred and thirty-eight were submitted via mail and nineteen online) have been completed as of January 13, 2014 (i.e., an 11% survey response rate). More information about the surveys, including survey instruments, can be found at http://www.nefsc.noaa.gov/read/socialsci/.

7.5.1 Updates to Status Determination Criteria and Annual Catch Limits

7.5.1.1 Revised Status Determination Criteria

7.5.1.1.1 Option 1: No Action

Under Option 1, there would be no revisions to the Status Determination Criteria (SDC) and numerical estimates of groundfish stocks would not change.

If Option 1 is selected, the primary result would be numerical estimates of SDCs based on outdated groundfish stock assessments. While this is not expected to have substantial immediate social impacts, the Attitudes, Beliefs, and Values of stakeholders could be negatively impacted if they perceive management to not be utilizing the best available science to make status determinations of groundfish stocks. It is worth noting, however, that some stakeholders remain skeptical of the science used to make SDC decisions even when SDC are updated. According to the SEAS survey, sixty percent of crew on vessels targeting groundfish (n=48) reported that they did not believe information that was presented to them by management. This pattern is not unique to groundfish fishermen, however, as about fifty-seven percent of crew on all other fishing trips (n=136) reported that they did not believe such information.

7.5.1.1.2 Option 2: Revised Status Determination Criteria

Under Option 2, the numerical estimates of the SDC for all groundfish stocks would be updated (Table 4). As a result of updated numerical estimates, MSY will be lower for GOM Cod, GB Haddock, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, American Plaice, Witch Flounder, GB Winter Flounder, and White Hake. While lower MSY does not necessarily lead to lower ACL, some of the aforementioned stocks will have substantial decreases in their ACL as a result of these updated estimates and related status determinations. If Option 2 leads to lower ACLs, the short-term social impact would be negative relative to the *Size and Demographic Characteristics* of the groundfish fishery. Lower ACLs will likely reduce fishing opportunity, thus contributing to potential declines in income and employment in the fishery.

Option 2 would reflect the most recent 2015 operational assessments and would be based on the best available science, consistent with the M-S Act. The social impacts of Option 2 relative to the *Attitudes, Beliefs, and Values* of the groundfish fishery are likely to be neutral and potentially negative given the scientific uncertainty associated with the status determinations of GB cod and Atlantic halibut. Although using the best available science to make status determinations and provide catch advice can lead to increases in positive attitudes among fishermen towards the management process, this effect could be mitigated by uncertainties about multiple stocks and the models used to assess them. This is especially likely when lower ACLs result from the revised SDC because it can directly impact the *Size and Demographics* of the fishery vis-à-vis income and employment reductions. These negative “felt” impacts, or negative changes to the socioeconomic well-being of fishing communities, increase the likelihood of negative “perceived” impacts, or negative changes to the *Attitudes, Beliefs, and Values* fishermen hold in regard to the management process. According to SEAS data, about seventy percent of groundfish fishing crew and vessel owners (n=56) reported that rules and regulations in their fishery have been too restrictive. Fishermen in all other fisheries were less likely to express such views; about sixty percent (n=182) reported rules and regulations were too restrictive in their respective fisheries.

With these precautions in mind, Option 2 would constitute the use of the best available science to determine stock status and this could alternatively lead to positive social impacts relative to the *Attitudes, Beliefs, and Values* of the groundfish fishery. If the prevailing perception among fishermen is that the best available science is being used to make stock status determinations, then the *Attitudes, Beliefs, and Values* of the associated fishing communities may reflect this positive impact.

Overall, the social impacts of Option 2 are neutral relative to No Action.

7.5.1.2 Annual Catch Limits

7.5.1.2.1 Option 1: No Action

If Option 1 is selected, there would be no changes to the specifications for FY 2016 – FY 2017 that were adopted by FW 53 (and default catch limits for stocks would remain until July 31, 2016 Additionally, quotas would not be specified for the transboundary Georges Bank stocks, namely eastern GB Cod, and eastern GB haddock, and GB yellowtail flounder. These stocks are managed through the US/CA Resource Sharing Understanding and the quotas are specific annually.

No Action would likely lead to high negative social impacts in terms of the *Size and Demographic Characteristics* of the groundfish fishery due to probable reductions in fishing opportunity and resultant losses in employment and income. Without annual catch limits specified, the fishery would revert to the default specifications and eventually shut down if no further action is taken. This would likely precipitate a reduction in income for vessels and loss of employment opportunities for crew members typically employed on vessels which target groundfish.

Additionally, electing to proceed with Option 1 would not constitute use of the best available science for catch advice and thus could have a negative impact on the *Attitudes, Beliefs, and Values* of stakeholders in the groundfish fishery. Perceptions of effective management are based in part on the use of good scientific information, so it follows that No Action would not be conducive to fostering positive attitudes among those in the groundfish fishing communities. Overall, No Action would be expected to have a negative impact relative to Option 2.

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

During the development of FW55, the Council considered multiple ABCs for witch flounder, along with separate SNE/MA yellowtail flounder sub-ACL values for the scallop fishery (Table 10). The Council considered two SNE/MA sub-ACLs for the scallop fishery (Table 115), one based on 90% of estimated catch (sub-Option 1A), and the other based on 100% (sub-Option 1B) of estimated catch (4.1.2.2.1). The difference between these sub-ACLs is likely to be negligible (32mt vs. 36mt), particularly as the scallop fishery catch in recent years has exceeded the sub-ACL associated with each sub-option (Table 83).

With regard to witch flounder, the Council considered a range of witch flounder ABC's between 399 mt and 500 mt. Table 10 describes the corresponding range of sector level sub-ACLs used in the QCM. Model results suggest that the groundfish revenues corresponding to the ABC's considered by the Council would be $67.9 million (ACL=418) – $68.8 million (ACL=304 & 361), with overlap in the confidence intervals of each output (Table 107). As such, the overall impacts of each of the witch flounder sub-options is likely to be similar with respect to each other, and negative when considered in the context of FW53 sub-ACLs (Table 107).

As shown in Table 107, the QCM predicts that increasing the witch flounder quota does not result in an overall change in predicted revenue among the range of quotas considered by the Council. However, results do indicate that the largest sector sub-ACL that the Council considered would likely result in revenue gains for 30-50 ft. vessels on the order of $100k - $200k dollars. Larger vessels showed a decrease of the same amount (Table 104). At the port level, among the noteworthy differences, Portland sees a relatively large decrease in groundfish revenue of $859,000 from the increase of the witch flounder sub-ACL from 304 mt to 418 mt. Other northern ports, including Boston and Gloucester, are also predicted to see decreases in groundfish revenue from a higher witch flounder sub-ACL, though not to the same extent as Portland. Ports in Southern New England, including New Bedford and Point Judith are predicted to see modest increases in groundfish revenue from the increased sub-ACL for witch flounder. Importantly, while the median values from the QCM results indicate southern ports to be more positively impacted from a higher witch sub-ACL than northern ports, the confidence intervals around these estimates are relatively wide. Considering these confidence intervals, it appears there will be relatively limited social impacts by port as a result of selecting the 304mt, 361 mt, or 418 mt sub-ACL for witch flounder with 10% ASM coverage.

- *Option 2 – Preferred Alternative, including*
    - *Sub-Option 1A – SNE/MA Yellowtail Flounder Scallop sub-ACL at 90% of Estimated Scallop Fishery Catch (Preferred Sub-Option)*
    - *Sub-Option 2B –Witch Flounder ABC of 460 mt (Preferred Sub-Option)*

Option 2 and the preferred sub-options would set the annual specifications for FY 2016 – FY 2018 for all groundfish stocks and FY 2016 – FY 2017 for GB yellowtail flounder would follow the specifications listed in Table 12. The witch flounder ABC would be set at 460 mt (Sub-Option 2B). This option also includes specifications of TACs for the US/Canada Management Area for FY 2016, as noted in Table 8, as well as specification for the scallop fishery sub-ACL for SNE/MA yellowtail flounder based on 90 percent of the estimated catch of SNE/MA yellowtail flounder by the scallop fishery (Sub-Option 1A). The following discussion compares Option 2 and the preferred sub-options to the No Action alternative, and quotas approved through FW 53.

Social impacts relative to No Action

Relative to the No Action alternative, Option 2 and the preferred sub-options may have low positive to neutral impacts on the *Attitudes, Beliefs, and Values* and *Size and Demographic Characteristics* of the groundfish fishery. While the SSC and Council considered multiple ABC for witch flounder, stakeholders in the groundfish fishery have voiced frustration with management and have questioned the science underlying stock assessments. No Action would likely be perceived as a continued failure of management to adequately address both ecological and socioeconomic concerns of the groundfish fishery.

Option 2 also provides for positive impacts in *the Size and Demographic Characteristics* relative to the No Action alternative. If no action is taken, there would be significant disruption in the fishing industry because transboundary specifications would not be set, the default catch limit would be set at 35% of the prior year's catch limit, and the default catch limit would expire on July 31st 2016. The results of these outcomes could precipitate major reductions in income and employment among vessels in the groundfish fishery. When compared to Option 1, the preferred alternative and sub-options are likely to avoid the potentially high negative impacts of taking no action.

Social impacts relative to FY 2015 specifications

Under the preferred alternative, total groundfish revenues are predicted to decline by 10% in FY 2016 from $76.3 million in FY 15 to $68.8 million, including industry-funded ASM at a 10% coverage rate (Table 107). Specifically regarding groundfish revenues from groundfish trips, revenues are predicted to decline about 12% from $59.2 million in FY 2015 to $52.2 million in FY 2016 (Table 107). GB winter flounder, GB cod, and witch flounder are predicted to see the largest decreases among groundfish stocks. With predicted revenue decreases for groundfish trips, there will likely be negative social impacts relative to the prior fishing year's specifications. Incomes from groundfish will likely be reduced and there may also be corresponding reductions in fishing employment opportunities. These impacts will likely not be distributed evenly across ports and state lines Table 113, however, so a discussion of the port- and state-level impacts is also provided in the following sub-section.

Social impacts at the state- and port-level relative to FY 2015 specifications

In terms of port- and state-level changes to revenues, Option 2 is predicted to have disparate impacts by location. Boston and Gloucester are predicted to see revenue increases relative to FY 2015 with industry-funded ASM, whereas New Bedford, Point Judith, and Portland are predicted to see groundfish revenue decreases relative to FY 2015. While port-level impacts are somewhat variable, state-level revenues are predicted to decrease across the board. Massachusetts is predicted to see the largest decrease in revenues at $2.1 million, followed by Rhode Island and Maine at $1.6 and $1.5 million respectively.

The negative social impacts resulting from Option 2 and the preferred sub-options would most likely be confined to New Bedford, Point Judith, and Portland, but would be quite significant in those ports nonetheless (Table 113). The *Size and Demographics*, and thereby the *Attitudes, Beliefs, and Values*, of the New Bedford fishery could be negatively impacted by such a drastic cut in revenues. On the other hand, the *Historical Dependence on and Participation in* the fishery may not be adversely impacted given the relative importance of the Atlantic sea scallop fishery to New Bedford. Moreover, the May 2014 release of Occupational Employment Statistics provided by the Bureau of Labor Statistics (BLS) reported a location quotient[23] of 0.49 for farming, fishing, and forestry occupations. A location quotient less than one indicates that a local concentration of employment is lower than that of the U.S. as a whole. Coupled with the estimate that employment in farming, fishing, and forestry is about 1.6 per 1,000 jobs in New Bedford, the BLS data suggest that fishing is not highly concentrated in New Bedford relative to the nation as a whole. This may also be indicative of the possibility that these reductions in revenues will not have major negative social impacts on the broader New Bedford economy and community, thus the impact on the *Historical Dependence and Social Structure and Organization* of this fishery is likely to be

[23] The location quotient is a ratio that compares the concentration of employment in an area to that of a larger area, typically local or state to U.S. overall. (http://www.bls.gov/oes/oes_ques.htm).

neutral. Similar outcomes are likely for Point Judith/Narragansett and Portland given the relative low concentration of the fishing industry in those communities as well.[24]

Scallop Fishery Sub-ACL for SNE/MA Yellowtail Flounder
This option would also continue to specify scallop fishery sub-ACLs for SNE/MA yellowtail founder at, 90 percent of the estimated scallop fishery catch (Sub-Option 1A). Under this option, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder is expected to decrease substantially. If accountability measures would be implemented in FY2017, this would curtail scallop vessel activity and subsequently reduce revenues. The extent of revenue reduction from the presence of AMs, which would be implemented in FY 2017, is uncertain at this time.

If AMs are triggered, Option 2 could have negative impacts in terms of the *Size and Demographics* of the scallop fishery by reducing revenues, thereby decreasing incomes and potentially affecting employment in that fishery. That said, the scallop fishery has not exceed its sub-ACL in recent years, and so the extent of long term impacts, while likely to be negative, is uncertain at this time.

7.5.2 Fishery Program Administration

7.5.2.1 Implementation of an Additional Sector

7.5.2.1.1 Option 1: No Action

Under Option 1, the Council would not approve the application of a new sector, Sustainable Harvest Sector II. This alternative would have neutral to negative impacts on at least three of the social impact factors relative to Option 2, namely the *Size and Demographic Characteristics, Attitudes, Beliefs, and Values,* and *Social Structure and Organization* of groundfish fishing communities.

Without the new sector requested by recent applicants, there may not be increased potential for income and employment in the fishery over and above what is already present with the current 24 approved sectors. On the other hand, some fishermen and other stakeholders have expressed concern that sectors contribute to the consolidation of the fishery. This would result in neutral-to-low negative impacts on the *Size and Demographics* relative to implementing Option 2.

In terms of *the Attitudes, Beliefs, and Values* of groundfish fishermen, Option 1 would have neutral to negative impacts due to disappointment likely to arise from perceived inaction and unfairness on the part of management. The sector approval process is already perceived as burdensome and the denial of a new sector would likely only contribute to negative attitudes towards the sector management system. Frustrations with the sector system overall, however, could overshadow the potential benefits of an additional sector if fears of consolidation spread with the implementation of additional sectors.

Option 1 may also have neutral to negative impacts on the *Social Structure and Organization* of the groundfish fishery relative to Option 2. Not approving an additional sector would not promote the potential for enhanced support from the fishery to the broader fishing communities which rely on the fishery for a variety of social and economic supports, such as a more robust and vibrant fishery with the flexibility to foster new relationships between community members and stakeholders. That said, any

[24] Farming, fishing, and forestry account for less than 0.05% of total employment in the Providence-Fall River-Warwick Metropolitan Statistical Area, the statistical area containing the port village of Point Judith, Narragansett (http://www.bls.gov/regions/new-england/news-release/pdf/occupationalemploymentandwages_providence.pdf). The farming, fishing, and forestry location quotient for Portland was 0.43 in 2014 (http://www.bls.gov/oes/current/oes_76750.htm#45-0000).

perceived consolidation of the fishery could precipitate fracturing of the fishing communities along pro-sector/anti-sector lines. Additional sectors may fuel such divisions among fishermen in the groundfish fishery and the associated fishing communities.

An additional limitation of Option 1 relative to Option 2 might be the long-term negative impact to the *Historical Dependence on and Participation* in the fishery. If an additional sector is not approved and all of the aforementioned negative impacts result, some groundfish fishermen may leave the fishery due to frustrations with management, the sector system, and the lack of new opportunities for social networking, employment, and income in the fishery and associated fishing communities.

7.5.2.1.2 Option 2: Implement a New Sector for FY 2016 *(Preferred Alternative)*

Under Option 2, Sustainable Harvest Sector II would be implemented and allowed to operate on May 1, 2016. A sector that wishes to begin operating in a given fishing year is required to submit a proposal and preliminary operations plan one year prior to the beginning of that fishing year. The anticipated impacts of Option 2 are neutral to positive relative to *the Size and Demographic Characteristics, Social Structure and Organization,* and *Attitudes, Values, and Beliefs* of the groundfish fishery and fishing communities.

The impact to particular individuals and communities will depend on whether they choose to join a sector and whether a community has a large proportion of individuals in sectors in comparison with the common pool. The approval of Sustainable Harvest Sector II could provide new fishing opportunities, thus contributing to increased employment and income for fishing communities. If individuals in the groundfish fishery choose not to join this sector, however, the potential for these positive impacts on the *Size and Demographic Characteristics* would be reduced and may have no discernible difference over selecting Option 1.

Sectors have the potential to be relationship-building or to breed disputes and strife, depending on the success of the individual organization. Participants in a sector become responsible for sharing resources and dividing shares of catch and profits amongst themselves. If relationships are good between members, a sense of community and partnership could flourish. However, the opposite could happen if sector members have bad interactions or do not cooperate. The approval of Sustainable Harvest Sector II could provide for positive social impacts as it relates to the *Social Structure and Organization* of the groundfish fishery should the relationship-building potential of this additional sector be realized. A recent study of social capital and economic performance among New England fisheries found positive correlations between measures of social capital and net revenue per active vessel among sampled sectors (Holland et al 2015).

While sectors are a form of catch shares that has extensive support among government agencies (including NOAA) and some environmental organizations, their application in the multispecies fishery has received a neutral/mixed reception from fishermen. There are those who welcome this opportunity to move away from the effort control system, but others are concerned that sectors will lead to further industry consolidation and make it more difficult for independent small vessel owners to remain viable. The impacts of approving Sustainable Harvest Sector II relative to the *Attitudes, Beliefs, and Values* of the groundfish fishery are likely to be neutral to low positive. Groundfish fishermen and stakeholders have voiced frustration with the sector management system. On the other hand, this additional sector is supported by at least some groundfish fishermen and if it provides the aforementioned positive impacts relative to the *Size and Demographics* and *Social Structure and Organization* it could increase the potential for positive impacts relative to the *Attitudes, Beliefs, and Values* of groundfish fishermen.

7.5.2.2 Sector Approval Process

7.5.2.2.1 Option 1: No Action

The process for creating a new sector, as described in Amendment 16, would not change under Option 1. Under the current regulations, a sector must submit its preliminary operations plan to the Council no less than one year prior to the date that it plans to begin operations. The Council must decide whether or not to approve the implementation of an additional sector through an action (Amendment or Framework). Any sector that is authorized by the Council must also submit an operations plan to NMFS. NMFS may consult with the Council and will solicit public comment on the operations plan consistent with the Administrative Procedures Act (APA). Upon review of the public comments, the RA may approve or disapprove sector operations through a final determinate consistent with the APA.

No action would likely produce neutral-to-negative impacts on the *Attitudes, Beliefs, Values* of groundfish fishermen relative to Option 2. Sector approval process could be perceived as overly burdensome and not conducive to the kind of flexibility needed to keep up with changing regulations and legal circumstances. These frustrations with the pace of change in rules and regulations have been echoed by SEAS survey results. Seventy-two percent of groundfish fishing vessel crew reported that rules change so quickly it can be hard to keep up.

7.5.2.2.2 Option 2: Revised Process for Approving New Northeast Groundfish Sectors *(Preferred Alternative)*

Under Option 2, the process for approving new groundfish sectors would be changed, such that new sectors would not need to be approved through a Council action. A sector would be required to notify the Council and NMFS in writing of its intent to form a new sector no later than 30 days prior to the deadline to submit an operations plan for the following FY. NMFS would make a determination about formation of the proposed sector consistent with the APA, and would approve or disapprove the operations plan through the existing process.

This option would add flexibility to the sector approval process, particularly with regard to the requirement for the Council to approve new sectors through a Council Action, and the requirement to submit a new sector formation proposal 1 year prior to when the sector wishes to begin operations. As a result, Option 2 would likely have neutral to positive impacts on the *Attitudes, Beliefs, and Values* of groundfish fishermen and communities. Recent research on groundfish fisheries management has highlighted flexibility as an important goal to strive towards in order to improve fishery management and community relations (Olson and Pinto da Silva 2014).

Also, recent survey data shows a relatively high proportion of groundfish fishermen are frustrated with management. According to SEAS data, about seventy-three percent of vessel owners fishing in the groundfish fishery reported that they were frustrated with management and regulations (n=26), compared with only fifty-four percent of vessel owners in all other fisheries (n=153). Greater flexibility may improve attitudes among some fishermen who hold negative views towards management, especially those who view rules and regulations as overly burdensome. Some evidence exists to suggest that groundfish fishermen are more likely to hold these views than fishermen in other fisheries. According to the SEAS survey of both vessel owners and crew, about forty-four percent of groundfish fishermen either agreed or strongly agreed that the rules have been easy to comply with (n=56), compared to about fifty-four percent of fishermen in all other fisheries (n=184). Overall, Option 2 would be expected to have a low positive social impact relative to No Action.

7.5.2.3 Modification to the Definition of the Haddock Separator Trawl

7.5.2.3.1 Option 1: No Action

If Option 1 is adopted, no changes would be made to the definition of the haddock separator trawl. Relative to Option 2, which would change the definition to require contrasting mesh colors, this No Action alternative will likely have neutral to negative impacts on the *Size and Demographic Characteristics* of the fisheries and fishing communities. As it is currently constituted, the definition does not account for color schema on large mesh separator trawls and enforcement officials have cited difficult in recognizing separator panels, thus slowing the speed of inspections and taking away from the time vessels could be spending on normal fishing operations. This reduces the potential for increasing income by fostering inefficient enforcement and could contribute to stagnating or declining incomes from sub-optimal fishing trip productivity.

7.5.2.3.2 Option 2: Revised Definition of the Haddock Separator Trawl *(Preferred Alternative)*

Contrasting colors on the horizontal large mesh separator panel are expected to make inspections by enforcement more efficient and this could lead to more time available for vessels to conduct their normal fishing operations. This may result in more income from increased productivity of vessels. Therefore, it is expected that Option 2 could have at least neutral to low positive impacts on fisheries and fishing communities in terms of the *Size and Demographics* and *Attitudes, Beliefs, and Values* relative to taking No Action.

That said, given the frustrations with management voiced through recent surveys, some may view this action as increasing the burdens and costs associated with complying with new rules and regulations. Fifty-nine percent of vessel owners (n=76) who responded to the SEAS survey item, “The rules and regulations in my primary fishery in 2012 caused my fishing costs to increase,” reported that they either agreed or strongly agreed with this statement. Perhaps more importantly, seventy-nine percent (n=77) of the vessel owners who responded to the SEAS item, “Over the next five years (2014-2018), I expect the rules and regulations in my primary fishery to cause my fishing costs to increase,” reported that they either agreed or strongly agreed with this statement. The total cost of the haddock separator panel per vessel, including materials and installation, is expected to be between $560 and $1,200 (see 7.4.2.3.2). This additional cost may be negatively impactful for smaller, owner-operated vessels, but the benefit of more efficient inspections could offset this initial cost and lead to improved attitudes among fishermen.

7.5.3 Commercial and Recreational Fishery Measures

7.5.3.1 Groundfish Sector Monitoring Program

7.5.3.1.1 Option 1: No Action

Under Option 1, the groundfish monitoring program would remain as defined in Amendment 16 and FW 48. The at-sea monitoring program would continue to be industry funded. The No Action alternative will likely have negative impacts on the *Size and Demographic Characteristics* of the fishery and *Attitudes, Beliefs, and Values* of fishermen relative to Options 2, 3, 4 and 5. Some groundfish fishermen have expressed their frustration with the monitoring programs in recent surveys of groundfish vessel owners. For example in response to a series of items on the SEAS survey asking vessel owners about their top three frustrations as commercial fishing vessel owners, one vessel owner commented, “observers – not necessary." After the shift to an industry-funded observer program, frustrations may increase among groundfish fishermen.

The Council may select Options 2, 3, 4, and 5 in this section.[25]

7.5.3.1.2 Option 2: Clarification of Groundfish Monitoring Goals and Objectives *(Preferred Alternative)*

Option 2 would clarify that the primary goal of the groundfish sector monitoring program is to verify area fished, catch, and discards by species, by gear type; and meeting these primary goals should be done in the most cost effective means practicable.

Greater clarification about the sector monitoring program would have neutral-to-low-positive impacts in terms of the *Attitudes, Beliefs, and Values* of groundfish fishermen. Fishermen are not as frustrated by the ease with which they are able to access the information they need regarding management and regulations. According to SEAS data, only about one-third of crew fishing on groundfish trips (n=43) disagreed/strongly disagreed with the statement, "Information about the rules and regulations that govern my primary fishery is easy to find." Most groundfish fishermen seem to at least agree or are neutral to the notion that information is easy to obtain, so greater clarity about the program will likely only provide minimal positive impacts, if any at all.

7.5.3.1.3 Option 3: Clarification of methods used to set sector coverage rates

- Sub-Option 3A: Clarify that coverage levels be set only using realized stock level CVs (*Preferred Alternative*)
- Sub-Option 3B: Multi-year approach to setting sector coverage (*Preferred Alternative*)

Option 3A would clarify the Council's intent that coverage levels for sectors should be set using only realized stock level CVs, and that overall coverage levels should not be set using an administrative standard of monitoring 80% of discards pounds at a CV30 at the sector/stock/gear level.

This alternative will likely have neutral to low-positive impacts on the *Attitudes, Beliefs, and Values* of groundfish fishermen. If fishermen perceive the scientific rationale for coverage rates as valid, then there may be less frustration with the program overall. That said, this is unlikely to offset the frustrations associated with the move to an industry-funded portion of the sector monitoring program.

Option 3B would specify that a multi-year average of realized stock-level CVs and corresponding coverage rates would be used when setting coverage levels on an annual basis, consistent with the requirement that minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology at the overall stock level. Option 3B may have low positive impacts relative to the *Attitudes, Beliefs, and Values* of groundfish fishermen, as a multi-year approach could appease some concerns fishermen have about the validity of methods used to determine coverage levels. Additionally, making coverage requirements more predictable for industry members and stakeholders could improve attitudes towards management. Applying a multi-year approach to the program coverage rates could bring some consistency to the management of fisheries which is at least perceived to be changing too often. According to SEAS survey results, about eighty-one percent of crew fishing in the groundfish fishery reported that they either agree or strongly agree that the rules change too quickly and

[25] The Council selected several ASM alternatives as preferred. The Council recommends that a tiered approach to setting coverage rates, whereby NMFS would first calculate the total observer coverage rate using a three year (fishing year) moving average, and then apply the prioritization approach laid out in Option 5.

that it can be hard to keep up (n=48). On the other hand, this appears to be less of an issue, relatively speaking, in all other fisheries, as about sixty-one percent of crew in all other fisheries agree/strongly agree that rules change too quickly and it can be hard to keep up (n=114).

7.5.3.1.4 Option 4: Remove ASM Coverage Requirements for a sub-set of sector gillnet trips

- Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear (*Preferred Alternative*)
- Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries[26]

Under Option 4A, ASM coverage would be removed for sector vessels fishing exclusively with extra-large mesh (ELM) gillnets of 10” or greater on a sector trip in specific BSAs (Figure 1). Vessels declaring an ELM trip would still be prohibited from changing this declaration during their trip and would be required to retain and land all groundfish of legal size for that trip. According to analyses presented in Figure 2, groundfish catch represented less than 5% of total catch on the majority of trips fishing multiple mesh sizes (large and ELM) in Broad Stock Areas 2 and 4. Option 4A is expected to reduce the cost of monitoring for sectors by removing the ASM requirement for trips fishing exclusively with ELM gear.

Relative to the No Action alternative, Option 4A would be likely to have positive impacts in terms of the *Size and Demographic Characteristics* and the *Attitudes, Beliefs, and Values* on fishermen in the groundfish fishery. As mentioned above in section 7.5.3.1, vessel owners in the groundfish fishery responding to the SEAS survey mostly reported that regulations caused costs to increase and that they expect costs to increase as a result of regulations in the next five years (2014-2018). Since this measure is expected to reduce at least some of the costs associated with the monitoring program, the *Attitudes, Beliefs, and Values* about management among some fishermen could improve. As it relates to the *Size and Demographic Characteristics* of fishing communities, Option 4A could relieve some financial pressure on sectors and as a result could increase employment and incomes, at least among those vessels affected. Improvements to the *Size and Demographics* could in turn improve the *Attitudes, Beliefs, and Values* of fishermen. However, if this observer coverage were to get shifted onto other components of the groundfish fleet (not using ELM), then Sub-Option 4A would may result in no overall or reduced cost savings.

ASM coverage would be removed for sector vessels fishing exclusively within the footprint and season of either the Nantucket Shoals Dogfish Exemption Area, the Eastern Area of the Cape Cod Spiny Dogfish Exemption Area, and SNE Dogfish Gillnet Fishery Exemption Area (Figure 1). Vessels making a declaration to fish in these areas would not be subject to ASM coverage. A vessel declaring to fish as a sector trip within a dogfish exemption area would still be prohibited from changing its declaration for that trip, and would be required to retain and land all groundfish of legal size on the trip. This means that only gillnet gear of 6.5” and greater can only be fished on this type of trip. NMFS would need to revise the PTNS to allow a vessel to indicate a trip would be fishing exclusively inside the footprint and season of dogfish exempted fisheries on either a groundfish DAS, a monkfish DAS, or both.

Option 4B would reduce the cost of monitoring while maintaining coverage levels because the majority of catch on sector trips using 6.5” diamond mesh gillnets or greater in BSA 2 and 4 is not composed of groundfish stocks, but rather mostly skates, monkfish, and dogfish. This Option is expected to have positive social impacts by decreasing costs associated with management and regulations, thereby

[26] The Council recommends that relief from ASM coverage for sector gillnet trips fishing ELM gear within the footprint of existing dogfish exempted fisheries should be handled by NOAA Fisheries in sector operations plans.

increasing incomes, revenues, and possible employment opportunities for sector vessels. This is directly related to the *Size and Demographic Characteristics* of the groundfish fishery, but may also indirectly improve the *Attitudes, Beliefs, and Values* of fishermen and other stakeholders involved in the groundfish fishery. If the socioeconomic conditions of the fishery improve even by a minor increment, attitudes towards management among crew and vessel owners, especially owner-operators, may improve somewhat given the trends in the survey data and public comment sections at Council meetings cited numerous times in the above sections. Aside from the reverberations from socioeconomic improvements, the attitudes towards management among fishermen may improve as a result of changes to an ASM program. The coverage levels as currently constituted may seem arbitrarily high to fishermen who have to bring an observer aboard on a trip which does not primarily target the species the observers are interested in assessing. In this case, it means relief for vessels fishing within the footprint season and season of either the Nantucket Shoals Dogfish Exemption Area, the Eastern Area of the Cape Cod Spiny Dogfish Exemption Area, and the SNE Dogfish Gillnet Fishery Exemption Area (Figure 1). However, if this observer coverage were to get shifted onto other components of the groundfish fleet (those not exempted), then Sub-Option 4B would result in no overall or reduced cost savings.

7.5.3.1.5 Option 5: Fishery Performance Criteria for Predicting the target ASM Coverage Level (*Preferred Alternative*)

Option 5 would set forth certain fishery performance criteria to be used in order to determine groundfish sector coverage levels. Stocks which meet all three of the proposed performance criteria would not need to meet the CV standard. The three fishery performance criteria would be as follows:

1. Stock condition – Not overfished and overfishing is not occurring.
2. The percentage of stock specific catch comprised of discards (10%).
3. The percentage of the sector sub-ACL harvested (75%).

Figure 2 demonstrates visually how the performance criteria would be applied in practice in order to determine coverage rates. Option 3 is expected to reduce the cost of monitoring associated with the sector monitoring program. The performance criteria would balance the goals of minimizing possible monitoring bias while helping to promote flexibility in the fishery and enhance socioeconomic viability.

Option 3 would likely result in low positive-to-positive impacts in terms of the *Size and Demographic Characteristics* and *Attitudes, Beliefs, and Values* of groundfish fishermen and stakeholders. Given the frustrations expressed with overly burdensome regulations, management, and observers as mentioned throughout this impact statement, any measure of reduction in the cost associated with coverage of the program would likely produce more favorable *Attitudes, Beliefs, and Values* among fishermen towards management. If utilizing the performance criteria leads to a reduction in costs associated with coverage, Option 3 would also likely have positive impacts on the *Size and Demographics* of the fishery by relieving some of the financial burden placed on vessels and sectors by this industry-funded management measure.

Combination of Options 2, 3A, 3B, 4A, and 5

The Council selected as its preferred alternatives: Option 2, 3A, 3B, 4A, and 5, in combination with each other. The Council clarified that Option 4B could be done through the sector exemption process if Option 4A was approved by NMFS. Taken in concert, this suite of options would reduce the observer coverage rate to 14% for the portion of vessels not included in the ELM exemption. This combination of alternatives would provide a substantial reduction relative to the No Action alternative, which would result in a coverage rate of 41%. If selected in combination, this suite of alternatives is expected to have positive social impacts relative to the *Size and Demographics* and *Attitudes, Beliefs, and Values* of the groundfish fishery. By limiting the extent of coverage of this industry-funded program, some vessel owners may find relief from the costs and responsibilities associated with compliance. In turn this may improve the attitudes of some vessel-owners towards monitoring and management in general.

In addition to reducing the costs and responsibilities placed upon vessel owners in the groundfish fishery, this combination of measures would provide a degree of consistency to the process of setting coverage rates. If fishermen are at least aware of what to expect from management in advance, they will be better able to prepare for potential costs and responsibilities associated with compliance. According to SEAS data, the pace of change in management has been a concern for groundfish fishermen in particular. Roughly eighty-one percent (n=48) of groundfish crew surveyed either agreed or strongly agreed that the rules change too quickly and that it can be difficult to keep up with the pace of change. A multi-year approach to setting coverage could alleviate this kind of pressure on fishermen to make year-to-year changes to their practices and procedures.

7.5.3.2 Management Measures for U.S. Georges Bank Cod TACs

7.5.3.2.1 Option 1: No Action

Option 1 would make no adjustments to the amount of the U.S. TAC for Eastern GB cod that is allocated to the Eastern U.S./Canada Management Area. Eastern GB cod is a sub-unit of the total GB cod stock. Under the current regulations, the U.S. share of the eastern GB cod can only be caught in the eastern U.S./Canada Management Area, and the remaining portion of the total ABC is only available outside if the eastern U.S./Canada Management Area. Option 1 could have negative social impacts by reducing the flexibility of fishing vessels. This would particularly affect communities that are more reliant on the EGB stocks. There may also be a negative social impact to the *Attitudes, Beliefs, and Values* of fishermen regarding the flexibility of management. Overall, No Action would be expected to have a negative social impact relative to Option 2.

7.5.3.2.2 Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod *(Preferred Alternative)*

Option 2 would allow a sector, or state-operated permit bank, to convert its Eastern GB cod and ACE to Western GB cod ACE at any time during the fishing year, and up to two weeks into the following fishing year. Option 2 would provide additional flexibility for sectors to harvest GB cod and mirrors a provision adopted in FW 51 which allows sectors and state-operated permit banks to move Eastern GB haddock ACE to the Western GB fishery. As is currently the case, sectors and state run permit banks receive eastern GB allocations as a share of their overall GB cod allocation, thus creating situations where vessels which have never fished in the Eastern U.S./Canada area have allocations of Eastern GB cod. This limits the amount of cod that could be caught in the Western area, may unnecessarily reduce flexibility, and potentially limit fishing in the Western U.S./Canada.

Option 2 could have positive impacts on the *Historical Dependence on and Participation in* the fishery by increasing the flexibility of fishing operations, thus helping to sustain communities which rely upon Eastern GB cod. This may also have positive impacts on the *Attitudes, Beliefs, and Values* of fishermen regarding the flexibility and responsiveness of management to the needs of the fishery. Overall, Option 2 would be expected to have a positive social impact relative to No Action.

7.5.3.3 Modification to the Gulf of Maine Cod Protection Measures

7.5.3.3.1 Option 1: No Action

Under Option 1, there would be no changes to the Gulf of Maine Cod Protection Measures implemented on May 1, 2015 date through FW 53. The recreational possession limit for GOM cod would remain at zero, and could only be adjusted through a future Council action. Relative to Option 2, this No Action alternative could have neutral to low negative impacts on the *Attitudes, Beliefs, and Values* of fishermen because it keeps the status quo of Council action to make changes based on new scientific information.

7.5.3.3.2 Option 2: Change in Authority to Modify GOM Cod Recreational Possession Limits *(Preferred Alternative)*

Option 2 would remove the prohibition on the possession of GOM cod by the recreational fishery, and once again allow the RA to set the GOM cod possession limit for recreational fishery as an AM after consultation with the Council. This would increase flexibility in management for the recreational fishery. Increased flexibility in this respect is expected to have neutral to low positive impacts on the *Attitudes, Beliefs, and Values* of fishermen due to the frustrations with management they have vocalized in the past. It is most likely that increased flexibility would be preferred over further Council actions to restrict or allow greater access to the fishery. Therefore, when compared to No Action, Option 2 would be expected to have a low positive to neutral impact on *Attitudes, Beliefs, and Values* of fishermen.

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 55 together with past, present, and reasonably foreseeable future actions that affect the human 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.

Valued Ecosystem Components (VEC)
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).

Temporal Scope of the VECs
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 the expected implementation of this framework (May, 2016) and 2021.

Geographic Scope of the VECs
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 framework 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.

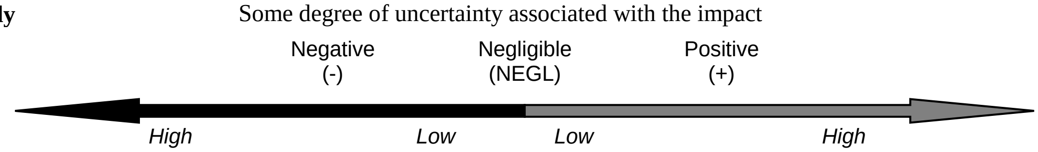
Analysis of Total Cumulative Effects
A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the 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 in Table 123. 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.

Impact definitions for the tables in this section are as summarized in Table 122.

Table 122 - Impact definitions for cumulative effects analysis.

	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible/Neutral**
Allocated target species, other landed species, and protected resources	Actions that increase stock/population size for stocks in rebuilding. For stocks that are rebuilt, actions that maintain stock population sizes at rebuilt levels. For protected resources, actions that increase the population size, or decrease gear interactions.	Actions that decrease stock/population sizes for overfished stocks. Actions that would cause a rebuilt stock to become overfished. For protected resources, actions that decrease the population size, or increase or maintain gear interactions..	Actions that have little or no positive or negative impacts to stocks/populations
Physical Environment/ Habitat/EFH	Actions that improve the quality or reduce disturbance of habitat	Actions that degrade the quality or increase disturbance of habitat	Actions that have no positive or negative impact on habitat quality
Human Communities	Actions that increase revenue and social well-being of fishermen and/or associated businesses	Actions that decrease revenue and social well-being of fishermen and/or associated businesses	Actions that have no positive or negative impact on revenue and social well-being of fishermen and/or associated businesses
	Impact Qualifiers:		
All VECs: Mixed	**both positive and negative**		
Low (L, as in low positive or low negative)	To a lesser degree		
High (H; as in high positive or high negative)	To a substantial degree (not significant)		
Likely	Some degree of uncertainty associated with the impact		



7.6.2 Past, Present, and Reasonably Foreseeable Future Actions

The following is a synopsis of the most applicable past, present, and reasonably foreseeable future actions (PPRFFA) that have the potential to interact with the current action. For a complete historical list of PPRFFAs, please see Amendment 16 – the last EIS developed for the NE Multispecies FMP.

Table 123 - Summary of Effects on VECs from Past, Present, and Reasonably Foreseeable Future FMP and Other Fishery Related Actions.

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Past and Present Fishing Actions					
Amendment 13 (2004) – Implemented requirements for stock rebuilding plans and dramatically cut fishing effort on groundfish stocks. Implemented the process for creating sectors and established the GB Cod Hook Gear Sector	**L+**	**H+**	**+ .**	**L+ .**	**Mixed**
FW 40A (2004) – allowed additional fishing on GB haddock for sector and non-sector hook gear vessels, created the GB haddock Special Access Pilot Program, and created flexibility by allowing vessels to fish inside and outside the U.S./Canada Area on the same trip	**Negl**	**L-**	**L-**	**Negl**	**+**
FW40B (2005) – Allowed Hook Sector members to use GB cod landings caught while using a different gear during the landings history qualification period to count toward the share of GB cod that will be allocated to the sector, revised DAS leasing and transfer programs, modified provisions for the Closed Area II yellowtail flounder SAP, established a DAS credit for vessels standing by an entangled whale, implemented new notification requirements for Category I herring vessels, and removed the net limit for trip gillnet vessels.	**Negl to L+**	**L-**	**L-**	**Negl**	**L+**

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW41 (2005) – Allowed for participation in the Hook Gear Haddock SAP by non-sector vessels	Negl	Negl	Negl to L -	Negl	+
FW42 (2006) – Implemented further reductions in fishing effort based upon stock assessment data and stock rebuilding needs, implemented GB Cod Fixed Gear Sector	L+	+	+	L+	Mixed
Atlantic Large Whale Take Reduction Plan	Negl to L-	Negl	Negl	+	L-
Monkfish Fishery Management Plan and Amendment 5 (2011) Implemented ACLs and AMs; set the specifications of DAS and trip limits; and make other adjustments to measures in the Monkfish FMP.	L+	+	+	+	Mixed
Spiny Dogfish Fishery Management Plan	Negl	Negl	+	Negl	L+
Amendment 16 to the Northeast Multispecies FMP (2009) Implemented DAS reductions and gear restrictions for the common pool, approved formation of additional 17 sectors	+	+	+	+	Mixed

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Skate Fishery Management Plan and Amendment 3 (2010) **Amendment 3 implemented final specifications for the 2010 and 2011 FYs, implemented ACLs and AMs, implemented a rebuilding plan for smooth skate and established an ACL and annual catch target for the skate complex, total allowable landings for the skate wing and bait fisheries, seasonal quotas for the bait fishery, new possession limits, in season possession limit triggers.**	+	+	+	+	-
FW 44 to the Northeast Multispecies FMP (2010) **Set ACLs, established TACs for transboundary U.S./CA stocks, and made adjustments to trip limits/DAS measures**	+	+	+	+	Mixed
FW 45 to the Northeast Multispecies FMP (2011) **Revised the biological reference points and stock status for pollock, updated ACLs for several stocks for FYs 2011–2012, adjusted the rebuilding program for GB yellowtail flounder, increased scallop vessel access to the Great South Channel Exemption Area, modified the existing dockside and at-sea monitoring requirements, established a GOM Cod Spawning Protection Area, authorized new sectors and adjusted TACs for stocks harvested in the US/ CA area for FY 2011.**	L+	L+	L+	L+	Mixed

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW 46 to the Northeast Multispecies FMP (2011) **Increased the haddock catch cap for the herring fishery to 1% of the haddock ABC for each stock of haddock.**	Negl	Negl	Negl	Negl	L-
Harbor Porpoise Take Reduction Plan (2010) **Plan was amended to expand seasonal and temporal requirements within the HPTRP management areas; incorporate additional management areas; and create areas that would be closed to gillnet fisheries if certain levels of harbor porpoise bycatch occurs.**	Likely +	Likely +	Likely +	Likely +	Likely -
Scallop Amendment 15 (2011) **Implemented ACLs and AMs to prevent overfishing of scallops and yellowtail flounder; addressed excess capacity in the LA scallop fishery; and adjusted several aspects of the overall program to make the Scallop FMP more effective, including making the EFH closed areas consistent under both the scallop and groundfish FMPs for scallop vessels.**	Negl	L+	Negl	Negl	L+
Amendment 17 to the Northeast Multispecies FMP **This amendment streamlined the administration process whereby NOAA-sponsored, state-operated permit banks can operate in the sector allocation management program**	Negl	Negl	Negl	Negl	Negl

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW 47 to the Northeast Multispecies FMP (2012) **FW 47 measures include revisions to the status determination for winter flounder, revising the rebuilding strategy for GB yellowtail flounder, Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs; adopting TACs for U.S/Canada area, as well as modifying management measures for SNE/MA winter flounder, restrictions on catch of yellowtail flounder in GB access areas and accountability measures for certain stocks**	Negl	+	+	Negl	-
Secretarial Amendment to Establish Annual Catch Limits and Accountability Measures for the Small-Mesh Multispecies Fishery **This amendment established the mechanism for implementing ACLs and AMs.**	Negl to L+	Negl	Negl	Negl	Negl to +
Amendment 3 to the Spiny Dogfish FMP **This amendment established a research set aside program, updates to EFH definitions, year-end rollover of management measures and revisions to the quota allocation scheme.**	Likely Negl	Likely Negl	Likely L+	Likely Negl	Likely L+

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Framework 24 to the Atlantic Sea Scallop FMP (Framework 49 to the Northeast Multispecies FMP) **This framework set specifications for scallop FY 2013 and 2014. It is also considered measures to refine the management of yellowtail flounder bycatch in the scallop fishery**	**Likely Negl**	**Likely Negl to L+**	**Likely Negl to L+**	**Likely Negl**	**Likely - to +**
FW 48 to the Northeast Multispecies FMP This FW modified the ACL components for several stocks, adjust AMs for commercial and recreational vessels, modify catch monitoring provisions, and allow sectors to request access to parts of groundfish closed areas.	**Mixed**	**+**	**+**	**+**	**Mixed**
FW50 to the Multispecies FMP This FW adopted FY2013-2015 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs)	**+**	**+**	**+**	**Negl**	**-**
FW51 to the Multispecies FMP This FW adopted FY2014-2014 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs) and included changes to management measures	**Mixed**	**+**	**+**	**Negl**	**Mixed**
Framework 25 to the Atlantic Sea Scallop FMP **This framework sets specifications for scallop FY 2014 and 2015. It is also considering accountability measures for windowpane flounder stocks.**	**Likely Negl**	**Likely Negl to L+**	**Likely Negl to L+**	**Likely Negl**	**Likely - to +**

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW52 to the Multispecies FMP **This FW would modify existing AMs for northern and southern windowpane flounder**	Likely L+	Likely +	Likely +	Negl	Likely +
FW53 to the Multispecies FMP **This FW adopted FY2015-2017 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs) and included changes to management measures including measures to protect GOM cod**	Mixed	Mixed	Mixed	Negl to Low -	Mixed
Framework 26 to the Atlantic Sea Scallop FMP **This framework would set specifications for scallop FY 2016 and 2017. It is also considering proactive accountability measures for windowpane flounder.**	Likely Negl	Likely Negl to L+	Likely Negl to L+	Likely Negl	Likely - to +
Reasonably Foreseeable Future Fishing Actions					
Omnibus Essential Fish Habitat Amendment **Phase 2 of the Omnibus EFH Amendment would consider the effects of fishing gear on EFH and move to minimize, mitigate or avoid those impacts that are more than minimal and temporary in nature. Further, Phase 2 would reconsider closures put in place to protect EFH and groundfish mortality in the Northeast Region.**	Likely +	Negl to L+	Negl to L+	Negl to Slight -	Mixed
Harbor Porpoise Take Reduction Plan (Potential Future Actions) **Future changes to the plan in response to additional information and data about abundance and bycatch rates.**	Likely L+	Likely +	Likely +	Likely +	Likely -

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
A18 to the Multispecies FMP This amendment would create accumulation limits, adjustments to management of Handgear A permits, and inshore/offshore measures could be developed through a framework.	**Negl**	**Likely L+**	**Likely L+**	**Negl**	**Mixed**
FW 54 to the Multispecies FMP/ Joint Monkfish Framework 9 This framework would modify regulations for vessels in the DAS program.	**Neg to Low-**	**Mixed**	**Mixed**	**Negl**	**Neg to L+**
Amendment 19 to the Atlantic Sea Scallop FMP This amendment would change the start of the FY to April 1, and develop a specification setting process	**Negl**	**Negl**	**Negl**	**Negl**	**Likely +**
Framework 27 to the Atlantic Sea Scallop FMP This framework would set specifications for scallop FY 2017 and 2018. It is also considering access areas.	**Likely Negl**	**Likely Negl**	**Likely Negl**	**Likely Negl**	**Likely +**

Note: ND = note determined

Table 123 summarizes the combined effects of 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 123 come from fishery-related activities (e.g., federal fishery management actions – many of which are identified above in Table 124). 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.

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.

Omnibus Essential Fish Habitat Amendment 2 is considering six types of management alternatives: (1) EFH designations, (2) HAPC designations, (3) Habitat Management Areas, (4) Spawning Management Areas, (5) Dedicated Habitat Research Areas, and (6) changes to approaches to framework adjustments and monitoring.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH designations consist of two complementary elements, the text descriptions, and the map representations. The EFH maps are generally based on trawl survey data, with higher relative abundance areas identified as EFH. Most of the maps are refined using depth and temperature data. A major improvement in the new text descriptions is their inclusion of specific depth and temperature ranges that more explicitly connect with the map representations of EFH.

This amendment also includes a number of alternatives to designate habitat areas of particular concern, or HAPCs. Designation of HAPCs is intended to indicate which areas within EFH should receive more of the Council's and NMFS' attention when providing comments on Federal and state actions, and in establishing higher standards to protect and/or restore such habitat.

The habitat management and spawning protection alternatives consist of combinations of current areas, modified versions of current areas, or newly identified areas. The alternatives were developed to address either adverse effects minimization, including more focused objectives related to juvenile groundfish habitat protection, or spawning protection objectives, respectively. Fishing restriction measures vary by area and alternative type. Generally mobile-bottom tending gear restrictions are proposed in habitat management areas and restrictions on gears capable of catching groundfish are proposed in spawning areas.

One approach to address habitat-related information needs is to designate Dedicated Habitat Research Areas (DHRAs) in concert with habitat management areas. These DHRAs would be the focus of research activities to provide information to managers, improve understanding of the ecological effects of fishing across a range of habitats, and ultimately improve model forecasts and inform future habitat management.

Amendment 18 addresses concerns regarding fleet diversity and fishery consolidation within the Northeast Multispecies FMP. A18 would create an accumulation limit on the Potential Sector Contribution that may be held in aggregate across all stocks to an average of no more than 15.5. A Northeast multispecies permit holder could retain one permit with PSC in excess of this limit, and would need to indicate to NMFS annually which permit(s) would be rendered unusable (such that useable holdings are within the limit). No additional permits could be retained. The permits rendered unusable could not be contributed to a sector or to the common pool. Additionally, it would create a limit on the number of permits that may be held to no more than 5%. These accumulation limits would apply to individuals, permit banks and other entities; and could be adjusted through a future framework adjustment due to a permit buyout/buyback program. The PSC cap would be enforced at the beginning of the fishing year following the year in which the limit is reached. For Handgear A (HA) Permits, A18 would remove the March 1-20 closure for common pool HA vessels; remove the standard fish tote requirement for HA vessels; and allow sectors to annually request that HA vessels fishing in the sector be exempt from use of VMS (would use IVR). Additionally, allow a Handgear A permit sub-ACL to be created through a future framework adjustment. For inshore/offshore GOM, the Council was interested in further developing the concepts through a future action. The concepts may include establishing an inshore/offshore boundary within the Gulf of Maine, splitting the GOM cod ACL into and inshore and offshore sub-ACLs, adjusting gear restriction boundaries, and creating declaration time periods for inshore and offshore areas. Current regulations already allow for each of these concepts to be developed through a framework adjustment.

Amendment 19 (A19) to the Scallop FMP is considering changing to elements of fishery program administration: 1) the development of a specification setting process for the scallop FMP, and 2) changing the start date of the fishing year to April 1 from March 1. These actions are aimed at addressing the late implementation of fishery specification.

Framework Adjustment 27 (FW 27) to the Scallop FMP is considering specifications for FY 2016 and FY 2017. The framework would limit access area trips to the Mid-Atlantic Access Area, and among other measures, allow the limit access General Category IFQ fleet to fish in the northern portion of the Nantucket Lightship Access Area.

Table 124 - Summary effects of past, present, and reasonably foreseeable future actions on the VECs identified for Framework 55.

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,	**Positive** Continued effort controls along with past regulations will likely help stabilize protected species interactions

			possibly increasing 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** Revenues would likely decline dramatically in the short term and may remain low 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 tables (Table 125 and Table 126) summarizes the added effects of the condition of the VECs (i.e., status/trends from Section 6.2) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 124 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 in Table 127.

Table 125 - Cumulative effects assessment baseline conditions of regulated groundfish stocks.

VEC		Status/Trends, Overfishing	Status/Trends, Overfished	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Regulated Groundfish Stocks	GB Cod	Unknown	***Yes***	**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
	GOM Cod	***Yes***	***Yes***		
	GB Haddock	No	No		
	GOM Haddock	No	No		
	GB Yellowtail Flounder	Unknown	Unknown		
	SNE/MA Yellowtail Flounder	***Yes***	***Yes***		
	CC/GOM Yellowtail Flounder	***Yes***	***Yes***		
	American Plaice	No	No		
	Witch Flounder	***Yes***	***Yes***		
	GB Winter Flounder	***Yes***	***Yes***		
	GOM Winter Flounder	No	Unknown		
	SNE/MA Winter Flounder	No	***Yes***		
	Acadian Redfish	No	No		
	White Hake	No	No		
	Pollock	No	No		
	Northern (GOM-GB) Windowpane Flounder	No	***Yes***		
	Southern (SNE-MA) Windowpane Flounder	No	No		
	Ocean Pout	No	***Yes***		
	Atlantic Halibut	Unknown	***Yes***		
	Atlantic Wolffish	No	***Yes***		

Table 126 – Cumulative effects assessment baseline conditions of non-groundfish species, habitat, protected resources, and human communities.

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 124)	Combined CEA Baseline Conditions
Non-groundfish Species (principal species listed in section 6.3)	**Monkfish**	Not overfished and overfishing is not occurring.	**Positive** – Continued management of directed stocks will also control incidental catch/bycatch.	**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.
	Dogfish	Not overfished and overfishing is not occurring.		
	Skates	Thorny skate is overfished and overfishing is occurring. Winter skate is not overfished but overfishing is occurring. All other skate species are not overfished and overfishing is not occurring.		
Habitat		Fishing impacts are complex and variable and typically adverse (see section 6.1); Non-fishing activities had historically negative but site-specific effects on 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. An omnibus amendment to the FMP with mitigating habitat measures is under development.	**Mixed** - reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as climate chanage, could increase and have a negative impact.
Protected Resources	**Sea Turtles**	Leatherback, Kemp's ridley and green sea turtles are classified as endangered under the ESA and loggerhead sea turtles are classified as threatened.	**Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact	**Positive** – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.
	Fish	Atlantic salmon, Shortnose sturgeon, and Atlantic sturgeon are classified as endangered under the ESA; Atlantic sturgeon Gulf of Maine DPS is listed as threatened; cusk and dusky shark are candidate species		
	Large Cetaceans	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.		
	Small Cetaceans	Pilot whales, dolphins and harbor porpoise are all protected under the MSA, the HPTRP and the Large Whale Take Reduction Plan Amendment		
	Pinnipeds	ESA classification: Endangered, number of nesting females below sustainable level; taken by longfin trawl		

Table 126, continued.

VEC	Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	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 55 Actions

The alternatives contained in Framework 55 are focused on changes to status determination criteria, specifications, fishery program administration, and management measures. The action modifies fishery program administration to implement a new sector for FY 2016, revise the process for approving new northeast groundfish sectors, and revise the definition of the haddock separator trawl and also for commercial and recreational groundfish fishing measures to modify and adjust the groundfish monitoring programs, allow for the conversion of Eastern GB cod ACE to Western GB cod ACE, and allow the RA to once again change the possession limit of GOM cod for the recreational fishery.

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 further builds upon the specifications adopted in Frameworks 44, 45, 46, 47, 48, 50, 51, and 53 that used the best available science 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 management measures in FW 55 are thus consistent with the amendment. These measures affect the prosecution of the commercial and recreational fishery. The proposed changes would implement a new sector for FY 2016, revise the process for approving new northeast groundfish sectors, and revise the definition of the haddock separator trawl, modify and adjust the groundfish monitoring programs, allow for the conversion of Eastern GB cod ACE to Western GB cod ACE, and allow the RA to once again change the possession limit of GOM cod for the recreational fishery.

In general, the adoption of these measures will benefit groundfish stocks because it will be more likely that mortality targets will not be exceeded. These measures are not likely to impact non-groundfish stocks, protected species, or habitat to any great extent when compared to the No Action alternatives.

Table 127 - Summary of Impacts expected on the VECs.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
UPDATES TO STATUS DETERMINATION CRITERIAAND ANNUAL CATCH LIMITS	**REVISED STATUS DETERMNA-TION 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 stock rebuilds
	REVISED OFL/ABCS/ ACLS	**Positive** – These ABCs, ACLs, and sub-ACLs, and the AMs will impose tighter controls on fishing mortality for these stocks 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	**Mixed** – While the Preferred Alternative produces more revenues than No Action, reduced ACLs (as compared to recent years) will result in continued reductions in fishing revenues in the short term. Overall revenues will increase as stocks increase.

Table 128 - Impacts of measures relating to Fishery Program Administration and Commercial and Recreational Management Measures.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
FISHERY PROGRAM ADMINISTRATION	**IMPLEMENTATION OF A NEW SECTOR FOR FY 2016**	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**Low positive-** Would provide for greater flexibility for fishing sectors to operate
	REVISED PROCESS FOR APPROVING NEW NORTHEAST GROUNDFISH SECTORS	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**Low positive-** Would provide for greater flexibility for fishing sectors to operate
	REVISED DEFINITION OF THE HADDOCK SEPARATOR TRAWL	**No impact to low positive**– When compared to No Action because measures are administrative, but could result in some positive benefits if the change in the gear leads to improved conservation.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative.	**No impact**– When compared to No Action because the measure is administrative and would not change the way the gear operates and interacts with EFH.	**Mixed-** Would provide for greater for improved enforcement and potentially reduced boarding times, however there is a cost associated with upgrading the net.
COMMERCIAL AND RECREATIONAL FISHERY MEASURES	**MODIFICATION AND ADJUSTMENTS TO GROUNDFISH MONITORING PROGRAM**	**Low negative** – When compared to No Action because the uncertainty in discards may increase for some stocks but is not likely to miss the CV 30 standard.	**Low negative** – When compared to No Action because the uncertainty in discards may increase for some stocks.	**Low negative** – When compared to No Action because the uncertainty in discards may increase for some protected resources	**No impact** –Fishing effort is not expected to be reduced or increased by this measure alone.	**Positive** – Overall reduction in costs for sectors relative to no action.

	DISTRIBUTION OF U.S. TACS FOR EASTERN/WESTERN GEORGES BANK COD	**No impact** – measures are not expected to create additional impacts to target species	**No impact** – measures are not expected to create additional impacts to non-target species	**No impact** –measures are not expected to create additional impacts to protected resources	**No impact** –measures are not expected to create additional impacts to habitat	**Positive** – Increasing access to landings will provide additional commercial fishing revenues and recreational opportunities
	MODIFY GULF OF MAINE COD RECREATIONAL POSSESSION LIMITS	**Low negative to neutral** – depending on the choice of recreational measures for GOM cod by the RA	**No impact** – measures are not expected to create additional impacts to non-target species	**No impact** –measures are not expected to create additional impacts to protected resources	**No impact** –measures are not expected to create additional impacts to habitat	**Positive** – Increasing access to landings will provide additional recreational opportunities

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 128 provides a summary of likely cumulative effects found in the various groups of management alternatives contained in FW55. The CEA baseline that, as described above in Table 125 and Table 126, 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.

<u>Managed Resources</u>

As noted in Table 125 and Table 126, 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 action proposed by FW 55 is expected to continue this trend. The adoption of specifications and management measures for the groundfish fishery are designed to meet fishing mortality targets and to promote stock rebuilding. The past and present impacts, combined with the Preferred Alternatives 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. In addition, the cumulative impacts of A18, FW 54 to the Monkfish FMP, and A19 and FW 26 to the Scallop FMP on groundfish species are likely to be negligible and potentially positive for some aspects.

Non-Target Species

As noted in Table 126, 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 action proposed by FW 55 is expected to continue this trend. The primary mechanism is through the reduced ABCs/ACLs (reduced from recent years). The modifications in management measures are expected to affect non-target species depending on fishing behavior. 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 126, 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 action proposed by FW 55 is 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. The reductions in ABCs/ACLs may provide short-term benefits to protected resources as groundfish fishing effort will decline, but as stocks rebuild effort may increase. Changes to management measures are not expected to affect protected species. Overall, the combination of past, present, and future actions is expected to stabilize protected species interactions and lead to positive, non-significant cumulative impacts to protected species.

Habitat, Including EFH

As noted in Table 126, 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. The management measures are not expected to have substantial impacts on habitat or EFH. The reduced ABCs/ACLs may result in reduced groundfish fishing activity and provide some minor short-term benefits to habitat. Overall, the combination of past, present, and future actions is expected to reduce fishing effort and hence reduce damage to habitat, resulting in slightly positive, non-significant cumulative impacts. However, it is likely that fishing and non-fishing activities will continue to degrade habitat quality.

Human Communities

As noted in Table 126, 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 and subsequent framework actions, 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. Implementing a new sector for FY 2016, revising the process for approving new northeast groundfish sectors, revising the definition of the haddock separator trawl, modifying and adjusting the groundfish monitoring program, allowing for the conversion of Eastern GB cod ACE to Western GB cod ACE, and allowing the RA to once again change the possession limit of GOM cod for the recreational fishery will provide some benefits to groundfish fishing communities. However, this action alone is not expected to have significant socioeconomic impacts beyond what was anticipated in Amendment 16. In addition, the cumulative impacts of A18, FW 54 to the Monkfish FMP, and A19 and FW 27 to the Scallop FMP on the groundfish fishery are likely to be negligible and potentially positive for some aspects. Overall, the combination of past, present, and future actions is expected to enable a long term sustainable harvest of groundfish stocks, which should lead to a long term positive impact on fishing communities and economies.

8.0 APPLICABLE LAWS

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 adjust ACLs set controls on catch to ensure that the appropriate fishing mortality rates are implemented. Changes to commercial and recreational fishery measures in Section 4.3 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 all stocks in the Northeast multispecies complex. These estimates are mostly in the form of information provided by the Northeast Fisheries Science Center in the TRAC and Integrated Peer Review, and 2015 Operational Groundfish Updates and Peer Review. Additionally, the 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 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 SNE/MA yellowtail flounder could differentially impact fishermen in the southern 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. 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. 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 time area closures, tend to increase the costs of fishing vessels since fishing catches are reduced. A specific measure in this action that would increase cost is the requirement for the middle panel of the haddock separator net to be a contrasting color to other sections of the net. These measures accomplish other goals, however, by allowing groundfish stocks to rebuild. The measures do not duplicate other regulatory efforts. 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 for GOM cod, GB cod, SNE/MA yellowtail flounder, GB winter flounder, and witch flounder 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 Alternative, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

8.1.2 Other M-S FCMA 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—

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.

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 information was updated for Amendment 18. This action provides a summary of that information and additional relevant information about the fishery in Section 6.6.

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 in Section 1.1. Impacts resulting from other measures in the management plan other than the measures 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.

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, 45, 47, 49, 50, 51, and 53. 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.

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.

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.

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 6.1.5.

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.

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 7.5.

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, and have been updated in subsequent frameworks, including FW 48, FW 51, FW 53, and this action, FW55.

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;

None of the measures in this framework are expected to increase bycatch beyond what was considered in Amendment 16.

Since this provision requires the establishment of a Standardized Bycatch Reporting Methodology (SBRM), in January 2006, development began on the Northeast Region Omnibus SBRM Amendment. This amendment covers 13 FMPs, 39 managed species, and 14 types of fishing gear. The SBRM Amendment was approved on October 22, 2007, and a final rule became effective on February 27. 2008, however, this SBRM was dismissed by the U.S. Court of Appeals for the District of Columbia Circuit in 2011 (No. 10-5299 Oceana, Inc. v. Gary F. Locke). That method no longer applies to this framework.

The final rule for the omnibus SBRM amendment, developed by both the New England and Mid-Atlantic Fishery Management Councils, was published on June 30, 2015. It is in place and applies to the groundfish fishery. The intended effect of the amendment was to implement the following: a new prioritization process for all allocation of observers if agency funding is insufficient to achieve target observer coverage levels, bycatch reporting and monitoring mechanisms, analytical techniques and allocation of at-sea fisheries observers, a precision-based performance standard for discard estimates, a review and reporting process, framework adjustment and annual specifications provisions, and provisions for industry-funded observers and observer set-aside programs.

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.

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 Amendment 18, and the commercial sector is updated and summarized in this document (Section 6.6).

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 management measures for some stocks within the existing allocation structure.

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.

The mechanism for establishing annual catch limits was adopted by Amendment 16. This action uses that mechanism to specify ACLs for future fishing years.

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 55 (Northeast Multispecies FMP) Preferred Alternative is to adopt modifications to management measures that will incorporate new information relative to effective program administration 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:

- Revised status determination criteria
- Revised groundfish specifications
- Revised administrative measures:
    - Implementation of an additional sector
    - Modification to the sector approval process
    - Modification to the definition of the haddock separator trawl
- Revised groundfish monitoring program
- Revised Management Measures for U.S. Georges Bank Cod TACs
- Revised GOM cod protection measures

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 Alternative. Several measures in this action are administrative with no direct impact to habitat, while some of the measures are expected to have neutral impacts on habitat.

Table 129 - Summary of possible effects to EFH as a result of Preferred Alternative

	Preferred Alternative
Possible negative impacts	
Neutral Impacts	Revised status determination criteria Revised groundfish specifications Implementation of a new sector for FY 2016 Revised process for approving for northeast groundfish sectors Revised definition of the haddock separator trawl Modifications and adjustment to the groundfish monitoring program Distribution of U.S. TAC's for Eastern/Western GB cod Modify the GOM cod protection measures
Possible Positive Impacts	
Uncertain Impacts	N/A

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 Alternative is unlikely to have noticeable impacts on EFH when compared with recent fishing activity; there may be low negative impacts when compared to the other alternatives.

8.2 National Environmental Policy Act

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 are 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 8.2.3 and Section 8.2.4.

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 3.0.
- 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 8.2.3.
- The index is in Section 0

8.2.2 Finding of No Significant Impact (FONSI)

National Oceanic and Atmospheric Administration Order (NAO) 216-6 (revised May 20, 1999) provides 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 management measures 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. 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, are the best options 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. As discussed in Section7.3, these species are expected to have very minimal impacts from the minor changes in fishing effort that are proposed by this action.

(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 and AMs 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 Preferred Alternatives are designed to continue the groundfish rebuilding programs that were first adopted in Amendment 13 to the Northeast Multispecies Fishery Management Plan and modified in subsequent actions, including Amendment 16. The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternative. As described in Section7.1.1, the measures in this action are designed to continue rebuilding/ promote target catch levels. The action cannot be reasonably expected to have significant impacts on habitat or protected species, as the impacts are expected to fall within the range of those resulting from Amendments 13 and 16. The action's potential economic and social impacts are also addressed in the environmental assessment (Sections 7.4 and7.5), as well as in the Executive Order 12866 review (Section8.11.1) and the Initial Regulatory Flexibility Act review (Section8.11.1.2).

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 actions on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." The EA for FW 55 describes and analyzes the preferred alternatives and concludes that 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 these criteria.

The Proposed Action is predicted to have a short-term adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses. The Preferred Alternatives would likely result in an increase in groundfish fishing vessel revenues when compared to No Action for ACLs. This is not informative, however, since No Action would adopt default specifications for the first three months of the FY for several stocks and the majority of groundfish fishing activity would be curtailed in the absence of new specifications. The preferred alternatives would be expected to result in $68.8 million in gross groundfish revenues for FY2016. This represents approximately a $7.5 million dollar reduction in predicted revenue from FY 2015, and a $12.5 million dollar reduction in predicted groundfish revenue for FY2014. The economic impacts of the preferred alternatives are not expected to be uniformly distributed across vessel size class and port. The implementation of an additional sector and the modification of the sector approval process would likely result in positive economic impacts for the fishery. The combination of preferred monitoring alternatives would likely result in 10% ASM coverage rate for sector vessels, and a reduction in costs for sectors relative to the No Action (41% coverage). Allowing the transfer of eastern Georges Bank cod to the western fishery is expected to add operational flexibility for sectors and permit banks, and yield positive economic impacts. Allowing the RA to once again change the possession limit of GOM cod for the recreational fishery is likely to vary, depending on whether or not the RA elects to increase the GOM cod bag limit from zero. Overall, the economic impacts of the proposed action are predicted to be negative.

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

Response: Some aspects concerning the science used to formulate the preferred alternatives on the quality of human environment are expected to be controversial. There is controversy over the scientific evaluation of current stock status that is used to determine future catches. Some members of the public beleive the 2015 assessments do not reflect what they see on the water, particularly for GB cod, GOM cod, American plaice, halibut, northern windowpane flounder, southern windowpane flounder, and witch flounder.

(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 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. 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 than provide only a point estimate. Overall, the impacts of the Preferred Alternatives can be, and are, described with a relative amount of certainty. Overall, the short-term economic impacts of the proposed action are predicted to be negative and the long-term impacts are uncertain but expected to be positive.

(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. The cumulative effects analysis presented in Section 7.6 of this document considers the impacts of the proposed action in combination with relevant past, present, and reasonably foreseeable future actions and concludes that no additional significant cumulative impacts are expected from the Proposed Action.

(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?*

Response: The Preferred Alternatives are 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 ship wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternative 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?*

Response: 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?*

Response: No, the Preferred Alternatives are not likely to establish precedent for future actions with significant effects. The Preferred Alternatives adopt 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 subsequent framework actions. 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?*

Response: 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?*

Response: 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 55 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 55 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.

Regional Administrator, Greater Atlantic Regional Fisheries Office, 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 June 2016 through January 2016 and were discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Date	Meeting Type	Location
6/4/15	Groundfish Committee	Hilton Garden Inn, Warwick, RI
6/16-18/15	Council	Hotel Viking, Newport, RI
9/2/15	Groundfish Advisory Panel	Hilton Garden Inn, Boston, MA
9/3/15	Groundfish Committee	Hilton Garden Inn, Boston, MA
9/29 -10/01/15	Council	Radisson, Plymouth, MA
11/12/15	Groundfish Advisory Panel	Holiday Inn by the Bay, Portland, ME
11/17/15	Recreational Advisory Panel	DoubleTree by Hilton, Danvers, MA
11/18/15	Groundfish Committee	Radisson, Warwick, RI
12/1-3/15	Council	Holiday Inn by the Bay, Portland, ME
1/14/16	Groundfish Committee	Doubletree by Hilton, Danvers, MA
1/26-28/16	Council	Sheraton, Portsmouth, NH

8.3 Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies conducting, authorizing or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species, or destroy or adversely modify designated critical habitat. The NEFMC has concluded, at this writing, that the proposed framework adjustment and the prosecution of the multispecies fishery is not likely to jeopardize any ESA- listed species, or destroy or adversely modify any designated critical habitat, based on the discussion of impacts in this document and on the assessment of impacts in the Amendment 16 Environmental Impact Statement.

The Council does acknowledge that endangered and threatened species may be affected by the measures proposed, but impacts should be minimal especially when compared to the prosecution of the fishery prior to implementation of Amendment 16. The NEFMC is now seeking the concurrence of the National Marine Fisheries Service with respect to Framework Adjustment 55.

For further information on the potential impacts of the fishery and the proposed management action on listed species, see Section 7.3 of this document.

8.4 Marine Mammal Protection Act

The NEFMC 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 7.3 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 55, 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 for TRAC by the Integrated Peer Review, and the 2015 Groundfish Operational Assessments and Peer Review 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.

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 Alternative were conducted using information from the most recent complete calendar years, through 2014, and in some cases includes information that was collected during the first eight months of calendar year 2015. Complete data were not available for calendar year 2015. 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 Greater Atlantic 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 55. 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. A list of MPA sites has been developed and is available at: http://marineprotectedareas.noaa.gov/nationalsystem/nationalsystemlist/ 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 55 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; and
- 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

This Regulatory Impact Review (RIR) is framed around the preferred alternatives selected by the New England Fishery Management Council (NEFMC) for Framework Adjustment 55 to the NE Multispecies

(Groundfish) Fishery Management Plan (FMP). The preferred alternatives were selected at the December 2015 NEFMC meeting in Portland, ME and the January 2016 NEFMC meeting in Portsmouth, NH.

8.11.1 E.O. 12866

The purpose of Executive Order 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." 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, of the principles set forth in the Executive Order

8.11.1.1 Objectives

The goals and objectives of Framework Adjustment 55 derive from those detailed in Amendment 16 to the Northeast Multispecies Fishery FMP and are as follows:

Goal 1: Consistent with the National Standards and other required provisions of the Magnuson-Stevens Fishery Conservation and Management Act and other applicable law, manage the northeast multispecies complex at sustainable levels.

Goal 2: Create a management system so that fleet capacity will be commensurate with resource status so as to achieve goals of economic efficiency and biological conservation and that encourages diversity within the fishery.

Goal 3: Maintain a directed commercial and recreational fishery for northeast multispecies.

Goal 4: Minimize, to the extent practicable, adverse impacts on fishing communities and shoreside infrastructure.

Goal 5: Provide reasonable and regulated access to the groundfish species covered in this plan to all members of the public of the United States for seafood consumption and recreational purposes during the stock rebuilding period without compromising the Amendment 13 objectives or timetable. If necessary, management measures could be modified in the future to insure that the overall plan objectives are met.
Goal 6: To promote stewardship within the fishery.

Objective 1: Achieve, on a continuing basis, optimum yield (OY) for the U.S. fishing industry.

Objective 2: Clarify the status determination criteria (biological reference points and control rules) for groundfish stocks so they are consistent with the National Standard guidelines and applicable law.

Objective 3: Adopt fishery management measures that constrain fishing mortality to levels that are compliant with the Sustainable Fisheries Act.

Objective 4: Implement rebuilding schedules for overfished stocks, and prevent overfishing.

Objective 5: Adopt measures as appropriate to support international trans-boundary management of resources.

Objective 6: Promote research and improve the collection of information to better understand groundfish population dynamics, biology and ecology, and to improve assessment procedures in cooperation with the industry.

Objective 7: To the extent possible, maintain a diverse groundfish fishery, including different gear types, vessel sizes, geographic locations, and levels of participation.

Objective 8: Develop biological, economic and social measures of success for the groundfish fishery and resource that insure accountability in achieving fishery management objectives.

Objective 9: Adopt measures consistent with the habitat provisions of the M-S Act, including identification of EFH and minimizing impacts on habitat to the extent practicable.

Objective 10: Identify and minimize bycatch, which include regulatory discards, to the extent practicable, and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

8.11.1.2 Description

A description of the entities affected by this Framework Adjustment, specifically the stakeholders of the New England Groundfish Fishery, is provided in Section 6.6 of this document.

8.11.1.3 Problem Statement

The need and purpose of the actions proposed in this Framework Adjustment are set forth in Section 3.2 of this document and are incorporated herein by reference.

8.11.1.4 Analysis of Alternatives

This section provides an analysis of each preferred alternative selected at the December 2015 NEFMC meeting for Framework Adjustment 55 to the NE multispecies fishery. The focus of this analysis will be on the expected changes in net benefits and costs to stakeholders of the New England groundfish fishery. Much of this information is captured already in Section 7.5 in this document.

<u>Impacts of Revised Annual Catch Limits and Groundfish Sector Monitoring Preferred Alternatives</u>

The Quota Change Model (QCM) has been used to predict the effects of quota changes on the sector portion of the commercial groundfish fishery since FW47 (FY 2012). New inputs and assumptions for the QCM in predicting FY 2016 results are detailed here along with preliminary model results and a brief discussion of noteworthy findings. A more detailed description of the background and methods of the QCM are available in the FW55 economic impacts (Section 7.4). All previous model assumptions remain intact. To summarize, these are:

- Stock conditions, fishing practices and harvest technologies existing during the data period are representative;

- Trips are repeatable;
- Demand for groundfish is constant, noting that fish prices do vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;
- Quota opportunity costs and operating costs are both constant; and,
- ACE flows seamlessly from lesser to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded.

Notable changes to the Quota Change Model are:

- FYs 2014 and 2015 used as inputs

In previous FWs, the QCM drew from the most recent fishing year for which a full year of data was available. For FW55, such an approach implies that FY 2014 would be the input dataset for FY 2016. Because the interim action for GOM cod and GOM haddock influenced fishing behavior for portions of FY14, using that year as the only input data is not considered appropriate. Accordingly, trips from FY15 (through November 2015) are added to supplement the FY14 trip data. Trips taken during FY14 and FY15 to areas that will be closed in FY16 are removed from the selection pool.

- At-sea monitoring

Industry-funded at-sea monitoring (ASM) is explicitly modeled within the QCM for the first time in FW55. The No Action simulation incorporates industry-funded ASM costs (at 37%). In order to more fully highlight the effect of incorporating industry-funded costs into the model separately from the effect of the ACL changes alone, separate simulations of the predicted outcomes from new FW55 ACLs were run with and without industry-funded monitoring costs in the model. The cost of coverage affects the types of trips likely to be taken by, primarily, negatively impacting trip-level net revenues. A sub-set of trips that are profitable under previous conditions will no longer be profitable with the addition of costs (see Figure 30 for more details). This has second-order effects on the distribution of catch across stocks as well as port and size class level impacts.

A target of **10% and 37% ASM coverage** is carried forward for inclusion in the QCM. To apportion this total cost to individual trips, a per-groundfish-pound ASM cost is estimated. The median per-pound cost to cover ASM costs at a rate of 10% for FY16 is estimated at \$0.0273/lb and at \$0.0916 for a rate of 37%. See economic impacts Section 7.4, for details on ASM cost calculations. The QCM assumes the requirement for industry-funded ASM in FY16 for sectors will not result in a shift of vessels from sectors to the common pool.

Overall QCM results

FY 2016 predictions for No Action ACLs (with industry-funded ASM at 37% coverage), revised ACLs without industry-funded ASM, and revised ACLs with industry-funded ASM (at 10% and 37% coverage) are presented in Table 107. With industry-funded ASM of 10% and revised ACLs in FY16, total revenues on groundfish trips are predicted to drop from \$76.3 million in FY15 (with no ASM costs) to \$68.8 million in FY16, a 10% decline. Revenues from groundfish on groundfish trips are predicted to drop from \$59.2 million in FY15 to \$52.4 million in FY16, an 11% decline. Similarly, in the absence of industry-funded ASM, total revenues on groundfish trips are predicted to drop to \$69.0 million in FY16, a

10% decline from FY15 predictions (with no ASM costs). Revenue from groundfish only on groundfish trips are predicted to drop to $52.4 million in the absence of industry-funded ASM, a 11% decline from FY15 predictions. Results with an ASM coverage rate of 37% are similar to those at 10%. Net revenues with industry-funded ASM are predicted to be lower.

When comparing FY16 stock-level predictions under industry-funded ASM (Table 130) with FY15 predictions (with no ASM costs) (Table 108), the three stocks with the largest absolute increase in average revenue are redfish ($3.7 million), pollock ($1.2 million), and GOM haddock ($0.7 million). The three stocks with the largest absolute decrease from FY15 to FY16 are GB winter flounder ($4.3 million), GB cod ($3.5 million), and witch flounder ($1.3 million). In terms of utilization rates, Table 130 shows the highest predicted utilization rates, assuming industry-funded ASM, to be GB cod west (100%), GOM cod (98%), SNE/MA yellowtail flounder (95%), and witch flounder (91%). Table 108 shows that for FY15, the highest predicted utilization rates are for GB winter flounder, GOM cod, and SNE/MA yellowtail flounder are all at 100%, and 95% for GB cod West.

Table 105 and Table 107 give the full range of QCM results under No Action ACLs (with industry-funded ASM coverage at 37%), revised ACLs without industry-funded ASM, and revised ACLs with industry-funded (at 10% and 37% ASM coverage).

In terms of groundfish revenue at the port level (Table 132), Boston and Gloucester are predicted to see revenue increases ($4.0 million and $2.4 million, respectively) relative to FY15 (with no ASM costs), assuming industry-funded ASM at 10% in FY16. Ports predicted to see groundfish revenue decreases relative to FY15 include New Bedford ($7.9 million), Point Judith ($1.1 million), and Portland ($1.6 million). At the state level, all states are predicted to see revenue decreases relative to FY15, with the exception of. New Hampshire which is predicted to see revenue increases ($0.2 million). In terms of absolute decreases, Massachusetts is predicted to see the largest decline in revenue at $2.4 million, followed by Rhode Island ($1.7 million), and Maine ($1.8 million). In the absence of industry-funded ASM, distributional impacts to ports and states are predicted to be similar as when the ASM requirement is in place. Results at an ASM coverage rate of 37% and with no ASM are similar.

In terms of groundfish revenue by vessel length (Table 8), vessels of 75'+ are predicted to see the largest revenue decreases both in terms of absolute value ($9.9 million) and percentage (26.7%) relative to FY15 (with no ASM costs), assuming industry-funded ASM in FY16 at 10%. Vessels in the 30-<50' category are predicted to have slight gains in revenue relative to FY15 with an increase of $0.1 million. Vessels in the 50-75' category are predicted to see revenue increases of $3.2 million, representing a 18.5% increase from predicted FY 15 revenues. Results at an ASM coverage rate of 37% and with no ASM coverage are similar.

Witch flounder sector sub-ACL of 361 MT and 418 MT

The QCM was used to evaluate the impact of increasing the witch flounder sector sub-ACL from 304 mt to 361 mt and 418 mt, assuming industry-funded ASM at 10% coverage. The results show that total revenues on groundfish trips are predicted to remain the same between 304 mt and 361 mt and decrease from $68.8 million to $67.9 million. Groundfish revenues are predicted to decrease slightly from $52.4 million to $52.2 million between 304 mt and 361 mt and further decline to $51.5 million at 418 mt. This decrease, although small, in groundfish revenue with a higher witch flounder sub-ACL is somewhat surprising given the wide geographic range of witch flounder and the fact that it is often caught with other groundfish species. Revenue from witch flounder is predicted to increase by $0.2 million from $1.4 to $1.6 million with the higher sector sub-ACL of 361 mt (Table 130) and increase an additional $0.2 at 418 mt (Table 131). However, the confidence intervals show that there is uncertainty surrounding these estimates and this change is within those confidence intervals. The discussion below examines output from the model but these differences are likely to be largely a result of random noise in the model. They should be interpreted with caution. The fact that there are multiple stocks across broad stock areas which are predicted to have high utilization rates further adds uncertainty into the model.

The model consistently showed other stocks (GB cod and GOM cod) to be more constraining than witch flounder and this is likely the primary reason that total and groundfish revenue increases did not materialize with a higher sub-ACL for witch flounder. Witch flounder-related revenue did increase across sector vessels when the sub-ACL was increased from 304mt to 418mt. However, these increases were offset by small, across the board, reductions in most other stocks. One exception is seen in the median revenue from plaice, a stock that is frequently caught with witch flounder, increased by $0.2.

In terms of witch flounder median utilization rates, a decrease occurred from 91% with a sub-ACL of 304 mt to 81% with a sub-ACL of 418mt. While witch flounder catch (and revenue) did increase when the sub-ACL was raised, the rate of increase was less than the rate of quota increase, resulting in a drop in utilization rates.

In terms of distributional changes, vessels of 30’ to <50’ are predicted to see groundfish revenue increases, with the model showing a roughly $100,000 increase across sector vessels when the witch flounder sector sub-ACL is increased from 304mt to 418mt. Conversely, vessels 75’+ are predicted to see revenue decreases with the model predicting a $600,000 drop in aggregate revenue (Table 133). At the port level, the model predicts Portland, ME to be negatively impacted by a higher witch flounder sector sub-ACL, with revenues dropping by $859,000 with a sub-ACL of 418mt relative to a 304mt sub-ACL. This drop would represent an 8.7% decrease from the aggregate port total. With a witch flounder sub-ACL of 361mt, Portland is still predicted to see a drop of $360,000 compared to the level of revenue with a 304mt sub-ACL. Point Judith, RI is predicted to see the largest increase in groundfish revenue with a higher sub-ACL, with a $107,000 increase when the sub-ACL is raised from 304mt to 418mt (Table 132).

The aggregate revenue and distributional impacts that the model predicts are a result of a shift in the profitability of fishing trips that are selected. When the witch flounder sub-ACL is increased, the quota cost of witch flounder is decreased and so trips that caught witch flounder become more likely to be selected. These trips however may have also landed other stocks that can be constraining and in effect lower aggregate groundfish revenue.

Table 130 - Stock Level QCM Results: Witch Flounder ACL = 361 mt, ASM coverage = 10%

spec	stock	Sub-ACL (mt)	Catch (mt)	Utilization	Revenue	p5 Revenue	p95 Revenue
haddock	gb_west	34,156	4,511	13%	$9,619,547	$8,477,777	$11,136,968
pollock	all	17,705	3,739	21%	$9,519,442	$8,835,447	$10,129,188
redfish	all	9,471	6,860	72%	$8,249,643	$7,481,355	$8,983,051
wh_hake	all	3,434	1,780	52%	$5,643,127	$5,247,860	$6,059,865
am_plaice	all	1,160	961	83%	$3,792,658	$3,545,718	$4,052,475
haddock	gb_east	17,053	1,574	9%	$3,290,543	$2,735,722	$3,853,793
winter_fl	gb	584	456	78%	$2,464,177	$2,063,073	$2,982,185
cod	gb_west	550	547	99%	$2,350,159	$2,248,421	$2,419,797
witch_fl	all	361	310	86%	$1,640,041	$1,542,188	$1,744,639
winter_fl	sne_ma	514	372	72%	$1,618,936	$1,259,053	$1,981,223
cod	gom	273	268	98%	$1,169,096	$1,120,279	$1,192,750
haddock	gom	2,385	365	15%	$1,085,528	$968,286	$1,214,118
yt_flounder	cc_gom	325	177	54%	$452,425	$390,519	$529,014
yt_flounder	sne	145	138	95%	$402,312	$359,542	$445,152
winter_fl	gom	604	85	14%	$322,167	$267,888	$392,386
halibut	all	0	45		$272,892	$256,093	$291,786
cod	gb_east	45	35	77%	$146,979	$115,322	$186,890
yt_flounder	gb	207	22	10%	$64,542	$44,426	$84,459
windowpane	north	0	78		$33	$10	$88
ocean_pout	all	0	28				
windowpane	south	0	68				
wolffish	all	0	17				
non_gfish	all	0	9,001		$16,634,934	$15,412,141	$18,206,727
				Total Groundfish	$52,241,216	$49,728,505	$54,481,247
				Total	$68,811,671	$65,966,465	$71,485,695

Table 131 - Stock Level QCM Results: Witch Flounder ACL = 418 mt, ASM coverage = 10%

spec	stock	Sub-ACL (mt)	Catch (mt)	Utilization	Revenue	p5 Revenue	p95 Revenue
haddock	gb_west	34,156	4,409	13%	$9,336,984	$8,155,337	$10,808,036
pollock	all	17,705	3,610	20%	$9,207,763	$8,607,823	$9,832,645
redfish	all	9,471	6,606	70%	$7,923,128	$7,096,174	$8,882,084
wh_hake	all	3,434	1,749	51%	$5,540,949	$5,148,018	$5,898,564
am_plaice	all	1,160	981	85%	$3,814,876	$3,563,550	$4,105,014
haddock	gb_east	17,053	1,474	9%	$3,102,593	$2,662,447	$3,651,116
winter_fl	gb	584	516	88%	$2,723,383	$2,251,764	$3,144,291
cod	gb_west	550	547	99%	$2,334,854	$2,232,986	$2,406,795
witch_fl	all	418	340	81%	$1,787,103	$1,672,827	$1,908,936
winter_fl	sne_ma	514	371	72%	$1,578,361	$1,286,441	$1,944,791
cod	gom	273	268	98%	$1,174,548	$1,125,442	$1,196,334
haddock	gom	2,385	366	15%	$1,090,557	$976,185	$1,208,185
yt_flounder	cc_gom	325	194	60%	$486,358	$423,252	$558,784
yt_flounder	sne	145	139	96%	$390,079	$342,352	$439,346
winter_fl	gom	604	88	15%	$338,466	$282,058	$418,165
halibut	all	0	45		$265,929	$246,941	$283,478
cod	gb_east	45	34	76%	$145,442	$116,161	$178,728
yt_flounder	gb	207	20	10%	$60,877	$45,640	$79,751
windowpane	north	0	79		$33	$1	$92
ocean_pout	all	0	29				
windowpane	south	0	68				
wolffish	all	0	17				
non_gfish	all	0	8,974		$16,419,511	$14,937,969	$18,031,233
				Total Groundfish	$51,460,759	$48,852,672	$53,742,609
				Total	$67,870,837	$64,509,734	$70,658,753

Table 132 - Port Level QCM Results: Witch Flounder ACL=361 mt and 418 mt, ASM coverage = 10%

	Witch Flounder ACL = 361 mt			Witch Flounder ACL = 418 mt		
	Rev	p5 rev	p95 rev	Rev	p5 rev	p95 rev
Connecticut	0.0	0.0	0.0	0.0	0.0	0.0
Massachusetts	38.6	35.0	42.5	38.3	34.1	42.4
Boston	16.7	15.3	18.1	16.6	14.9	18.0
Gloucester	10.8	9.9	11.7	10.5	9.3	11.6
New Bedford	9.0	8.1	10.0	9.1	8.1	10.0
Maine	10.8	9.4	12.2	10.3	9.1	11.9
Portland	9.5	8.3	10.7	9.0	7.9	10.3
New Hampshire	1.4	1.2	1.7	1.4	1.2	1.7
New Jersey	0.0	0.0	0.0	0.0	0.0	0.0
New York	0.2	0.2	0.3	0.3	0.2	0.4
Rhode Island	1.0	0.8	1.3	1.0	0.8	1.3
Point Judith	0.8	0.7	1.0	0.9	0.7	1.0
Other Northeast	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	52.2	49.7	54.5	51.5	48.9	53.7

Table 133 - Vessel Size Level QCM Results: Witch Flounder ACL = 361 mt and 418 mt, ASM coverage = 10%

	Witch Flounder ACL = 361 mt			Witch Flounder ACL = 418 mt		
Length class	**Rev**	**p5 rev**	**p95 rev**	**Rev**	**p5 rev**	**p95 rev**
<30'	0.2	0.1	0.3	0.2	0.1	0.3
30'to<50'	4.5	4.1	4.9	4.7	4.3	5.0
50'to<75'	20.0	18.8	21.4	19.9	18.6	21.3
75'+	27.4	25.3	29.6	26.6	24.7	28.6
TOTAL	52.2	49.7	54.5	51.5	48.9	53.7

Discussion of QCM Results

Several findings from the QCM stand out. The first is that the impacts of FW55 quota changes are predicted to have serious distributional impacts. Specifically, ports such as Point Judith, RI and New Bedford, MA, as well as more southern ports in New Jersey and New York, are predicted to see declines in gross revenues on the order of 47-100%. New Bedford alone is predicted to lose 47% of its FY15 groundfish revenues, or $7.9 million dollars. Rhode Island is predicted to lose 65% of its FY15 gross revenues from groundfish. Conversely, Boston and Gloucester are predicted to see large increases in gross groundfish revenues (31 and 29%, respectively). These large changes indicate a high degree of uncertainty for the fishery, as businesses strive to re-balance their catch with their allocations. Importantly, four stocks are predicted to be constraining: GOM cod, GB cod, SNE/MA yellowtail flounder, and witch flounder. The geographic breadth of these constraining stocks has no precedent over the past five years of the Sector system.

Redfish landings are predicted to increase by 75% to roughly 7,000 mt in FY16. Redfish ex-vessel prices are also predicted to increase by 8% to $.55/lb. This combination results in a redfish-revenue increase from $4.8 million in FY15 to $8.5 million in FY16, a 77% increase. Under the FW55 sector sub-ACLs, redfish trips are among the most profitable, with or without industry-funded ASM coverage. While the model assumes that trips are replicable, this level of redfish landings and revenues should be considered uncertain since the market has not previously seen these volumes.

On the other hand, and as discussed in the methods section, the QCM has generally under-predicted fishery-wide revenues. Groundfish fishermen have found ways to optimize around new constraints (namely lower quotas) in the past and they will attempt to do so in FY16 as well. An increase in catch per unit effort (CPUE), especially for stocks with high quotas (e.g., redfish, GB haddock, pollock, and white hake) could drive revenues higher than predicted as well.

Lastly, the industry-funded ASM requirement for sectors in FY16 is not predicted to decrease total revenue, but will result in a decrease in net revenue as ASM is predicted to cost sectors $1.3 to $4.4 million in FY16. One bright spot for the groundfish fishery is the decline of fuel prices in recent months (Figure 2). Noting that the number of trips taken, and predicted, is roughly stable from 2013-2016, lower fuel prices contribute significantly to a predicted $5 million reduction in fleet-wide variable costs from FY14-FY16. However, if ASM costs materialize as modeled here, the $1.3-$4.4 million cost will erode much of the savings generated by lower fuel costs.

Changes in Net Revenue relative to previous fishing years

Estimating how net revenues in FY16 vs. previous fishing years will change, given the preferred alternatives for Annual Catch Limits and Observer Coverage Rates, is complex. The lower ACLs for FY16 are predicted to decrease sector gross groundfish revenues from FY15 values, and the FY16 predictions would represent the lowest gross groundfish revenues since the implementation of sectors. Industry-funded ASM will also add an additional cost to sectors that has not existed up until this point.

Given this combination, one might expect net revenues in FY16 to be lower than in previous fishing years. It is difficult to state if this will be the case, largely because the QCM generally under-predicts effort (and in-turn, variable costs). One factor that will certainly favor higher net revenues than the most recent completed fishing years (FYs 13 and 14) is the decline in fuel prices. These prices dropped sharply from FY13 to FY14 and then again for FY15, up to this point. The result is estimated trip costs in FY16 (using FYs 14-15 as input data for the QCM) are much lower than those estimated for FY15 in FW53 (FY13 input with higher fuel prices).

Ultimately, net revenues will depend greatly on how well the groundfish fishery is able to optimize around the numerous stocks which could potentially be constraining. With a number of high-utilization stocks set to have large quota reductions in FY16 (GB cod, GB winter flounder, SNE/MA yellowtail flounder, and witch flounder), avoiding an in-season closure will be of great importance to sectors.

<u>Impacts of other FW55 Preferred Alternatives</u>

Revised Status Determination Criteria

- *Preferred Alternative- Option 2: Revised Status Determination Criteria*

Under Option 2, the numerical estimates of the SDC for all groundfish stocks would be updated (Table 4). Option 2 would reflect the most recent 2015 operational assessments and would be based on the best available science, consistent with the M-S Act. Given that this updated information should provide more accurate estimates of the Maximum Sustainable Yield (MSY) and the fishing mortality (F) at MSY for groundfish stocks, the long term economic impacts of Option 2 would expected to be positive. However, as there is always some degree of uncertainty surrounding Biological Reference Point estimates, a definitive statement on long term impacts cannot be made.

Implementation of an Additional Sector

- *Preferred Alternative- Option 2: Implement a New Sector for FY 2016*

The economic impacts of Option 2 would likely be positive relative to No Action. Since the widespread implementation of sector management through Amendment 16 to the Groundfish FMP, the limited access groundfish fleet and fishery managers have gained experience of how the fishery operates under the current management regime. It is reasonable to believe that these experiences are leading to an informed decision and the implementation of a new sector at the start of FY2016 will increase the efficiency of Sustainable Harvest Sector operations.

Sector Approval Process

- *Preferred Alternative- Option 2: Revised Process for Approving New Northeast Groundfish Sectors*

The economic impacts of Option 2 would be low positive relative to No Action. Option 2 would lessen the administrative costs of approving a new sector by not requiring the proposed sector to undergo review within a Council action (framework or amendment). Additionally, by streamlining the sector approval process, sector managers would be offered more time to make an informed decision on whether or not to apply for the implementation of a new sector in the following fishing year. Any proposed sector would still be required to submit its preliminary operations plan to the Council and NMFS prior to the submission of a final operations plan to NMFS. Accordingly, Option 2 would not result in the implementation of any sector that is expected to have adverse economic impacts to the remainder of the groundfish fishery.

Modification to the Definition of the Haddock Separator Trawl

- *Preferred Alternative- Option 2: Revised Definition of the Haddock Separator Trawl*

The economic impacts of Option 2 would be mixed relative to No Action. Option 2 would require all vessels operating with a Haddock Separator Trawl (HST) to use a separator panel of contrasting color to those sections of the net that it separates. This action would require all vessels operating under the current definition of the HST to incur the upfront cost of replacing the panel portion of the trawl.

During fishing years 2013-2015, there were 46 unique vessels that had at least one trip in which they operated with a HST, according to their Vessel Trip Report (VTR). This figure represents the estimated number of vessels for which the owner would have to pay for the cost of materials and labor associated with replacing the HST panel. The cost of panel twine is estimated to be $360 - $800 and the cost of installing the new panel is estimated to be $200 - $600, for a total estimate of $560 - $1,400 per panel. Multiplying the estimated number of vessels operating with a HST by the cost of replacing the panel results in a one-time total cost estimate to the groundfish fleet between $25,760 (46*$560) and $64,400 (46*$1,400). This estimate assumes that each vessel identified as using a HST during fishing years 2013-2015 has only one HST for which the panel must be replaced under Option 2.

The economic benefit associated with Option 2 would be in time savings to members of the Coast Guard conducting inspections and to vessels which have to delay fishing operations while inspections occur. If the value of time saved to both parties during FY 2016 and beyond exceeds the cost of replacing the HST panels, then the economic impacts of Option 2 would be positive. However, the amount of time that would be saved per inspection under Option 2 and the number of Coast Guard inspections that occur each fishing year is unknown.

Groundfish Sector Monitoring Program

The RIR, among other things, "provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem". To that point, the issue of coverage levels is being addressed in FW55, though industry-funded ASM was stipulated in Amendment 16 to the Groundfish FMP. It is anticipated that 2016 will be the first full fishing year for which groundfish sectors will be required to pay for ASM coverage, and FW55 marks the first action in which ASM costs to sectors have been explicitly modeled within the Quota Change Model (see pg. 3). The level of ASM coverage in the groundfish fishery is being revisited in this action because 1) Stock-level CVs have generally been well below the required CV30 threshold for FYs 2010-2014 and 2) A decrease in coverage will mean ASM costs will be less of a burden on the fishery, which has been in a period of decline in terms of revenue.

- *Preferred Alternative - Sub-Option 3A:* Clarify that coverage levels be set only using realized stock level CVs

Option 3A would result in a lower level of coverage relative to No Action and thereby a reduction in cost to sectors. If monitoring 80% of discarded pounds at CV30 at the sector/stock/gear level were to be required in FY 2016, the No Action target coverage rate would be 41% (Table 84). Under Sub-Option 3A, in which this would not be a requirement, target coverage would be set at 37% and be driven by redfish. Assuming NEFOP coverage were to be set at 4% for FY 2016, ASM target coverage rates would be 33%

Under Sub-Option 3A, using the same effort assumption as in the No Action alternative, an ASM coverage rate of 33% would result in ASM costs of $4.7 million (20,000*.33*$710). Sub-Option 3A would yield in an estimated $0.6 million decrease in ASM costs to groundfish sectors during FY 2016 relative to No Action.

- *Preferred Alternative - Sub-Option 3B: Multi-year approach to setting sector coverage*

Option 3B would result in a lower level of coverage relative to Sub-Option 3A and the No Action Alternative thereby resulting in a reduction in cost to sectors. Under Sub-Option 3A, in which only one year of CV data (FY 2014) would be used to set a total coverage target, the coverage rate would be set at 33%, assuming NEFOP coverage were to be set at 4%. Appendix IV in PDT memo to GF committee shows that has more years of data are used, the average required coverage to achieve CV30 across all stocks declines. With three years of data, the average falls to 17% (based on redfish); with five years of data, the average falls to 12% (based on GB winter flounder).

Assuming NEFOP coverage of 4% for FY 2016, the target coverage would be 14% when using 3 years of data and 8% when using 5 years of data. Assuming 20,000 days absent, and a cost of $710 per observed seaday, the cost of ASM to sectors would be $1.8 million (20,000*.13*$710) using the 3 year approach and $1.1 million using the 5 year approach (20,000*.08*710) under Sub-Option 3B. The 3 year approach would represent savings of $3.5 million relative to No Action ($5.3 million) and $2.9 million relative to Sub-Option 3A ($4.7 million). The 5 year approach would represent savings of $4.2 million relative to No Action and $3.6 million relative to Sub-Option 3A. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate.

The overall impacts of Option 3 relative to No Action cannot be determined, as the benefits of ASM are not quantifiable at this time. While increased coverage leads to a better estimate of discards and improved stock estimates, the marginal value of each % increase in coverage is unknown.

- *Preferred Alternative -- Sub-Option 4A: Remove ASM coverage requirements for sector trips fishing extra-large mesh (ELM) gillnet gear in BSAs 2 and 4*

During FYs 2012-2014, there were 343 sector trips carrying an ASM observer and fishing strictly with gillnets of mesh size 10” or greater in broad stock areas 2 and 4 (Table 134). At an annual rate, the number of trips is 114. This is the estimated number of sector trips fishing exclusively with gillnets of mesh size 10” or greater that will occur during FY 2016 and will be exempt from ASM coverage. Based on the average trip length for gillnet vessels during FY 2014 (0.8 days), the number of seadays from these 114 trips is estimated to be 91. The monitoring cost of each observed seaday is $710, meaning Option 4A would result in cost savings of $64,610 (710*91) compared to Option 1 for the portion of the groundfish fleet fishing with ELM gillnets during FY 2016. However, if this observer coverage were to get shifted onto other components of the groundfish fleet, then Sub-Option 4A would result in no overall cost savings.

Table 134 - Number of ASM observed trips fishing strictly with ELM (10"+) gillnets in BSAs 2 & 4, FY 2012 - FY 2014.

ASM only	Fishing Year			
BSA	2012	2013	2014	Grand Total
IGB - BSA 2	37	41	83	161
SNE - BSA 4	127	13	42	182
Grand Total	164	54	125	343

Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries

The number of sector trips to the three dogfish exemptions specified in Alternative 4.3.1.4.2 is given in Table 135. While only gillnet trips to these exemption area would not be required to adhere to ASM coverage requirements, trawl gear is allowed in the Nantucket Shoals Dogfish Exemption Area and longline and handgear is allowed in the Cape Cod Spiny Dogfish Exemption Area. Table 135 includes all gear types, and so the number of sector trips that would have been impacted under Sub-Option 4B during FYs 2012-2015 should be considered an overestimate.

Table 136, which sums up sector trips across the three exemption areas, therefore would also be an overestimate of the number of sector trips that would have been impacted under Sub-Option 4B. Nevertheless, the 469 average ASM trips to these exemption areas per fishing year are used as a proxy for FY 2016 effort. Based on the average trip length for gillnet vessels during FY 2014 (0.8 days), the number of seadays from these 469 trips is estimated to be 375 in FY 2016. The monitoring cost of each observed seaday is $710, meaning Sub-Option 4B would result in cost savings of $266,250 (710*375) compared to Option 1 for the portion of the groundfish fleet fishing with ELM gillnets in the dogfish exemption areas during FY 2016. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate. If observer coverage were to get shifted onto other components of the groundfish fleet, then Sub-Option 4B would result in no overall cost savings to sectors.

Table 135 - Total trips and sector trips fishing in the dogfish exemption areas specified in Alternative 4.3.1.4.2, FY 2012 - FY 2015.

Nantucket Shoals Dogfish Exemption Area					
EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIPS	SMALL MESH TRIPS	LOA TRIPS
Nantucket Shoals	2015	1110	1063	0	0
Nantucket Shoals	2014	1069	1034	4	0
Nantucket Shoals	2013	965	919	3	0
Nantucket Shoals	2012	1231	1215	3	0

Cape Cod Spiny Dogfish Exemption Eastern Area			
EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIPS
Cape Cod Eastern Area	2015	1023	647
Cape Cod Eastern Area	2014	1598	573
Cape Cod Eastern Area	2013	1239	517
Cape Cod Eastern Area	2012	1846	1227

SNE Dogfish Gillnet Exempted Fishery			
EXEMPTION	FISHING YEAR	TRIPS	SECTOR TRIP
SNE Gillnet	2015	790	265
SNE Gillnet	2014	1766	418
SNE Gillnet	2013	1550	262
SNE Gillnet	2012	1987	381

*Trips based on VTR reported coordinates and exclude state, party/charter, and research trips
Data Source: DMIS, Greater Atlantic Regional Fisheries Office

Table 136 - Total sector trips and number ASM trips, assuming 22% coverage.

Fishing Year	Sector Trips	Number of ASM Trips, assuming 22% coverage
2015	1,975	435
2014	2,025	446
2013	1,698	374
2012	2,823	621
Avg. 2012-2015	2,130	469

- *Preferred Alternative* -- *Fishery Performance Criteria for Predicting the target ASM Coverage Level*

Economic impacts relative to No Action

Option 5 would result in a lower level of ASM coverage relative to No Action and thereby a reduction in cost to sectors. Under the Fishery Performance Criteria, redfish would be exempt from the CV 30 standard, and GOM winter flounder would drive the target observer coverage rate, which would be set at 26%. With assumed NEFOP coverage of 4%, the ASM target coverage rate would therefore be 22%. The number of predicted whole days absent by sector vessels on groundfish trips during FY 2016 is 20,000. Under Option 5, an ASM coverage rate of 22% would result in ASM costs of $3.1 million (20,000*.22*$710). If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate. Option 5 would yield in an estimated $2.2 million decrease in ASM costs to groundfish sectors during FY 2016 relative to the No Action alternative.

Economic impacts relative to FY 2015

Option 5 would result in a target observer coverage rate of 26% during FY 2016, a 2% increase relative to the FY 2015 target of 24%. Assuming a 4% NEFOP target coverage level in FY 2016, the ASM target coverage level would be 22%. As sectors will be responsible for funding ASM coverage throughout FY 2016, this will represent a significant cost that up to this point was not borne by the fishery. As stated above, the estimated cost of ASM during FY 2016 under Option 5 would be $3.1 million.
The overall impacts of Option 5 cannot be determined as the benefits of ASM are not quantifiable at this time. While increased coverage leads to a better estimate of discards and improved stock estimates, the marginal value of each % increase in coverage is unknown.

Economic impacts of all ASM options combined (Options 2, 3A, 3B, 4A and 5 (75/10))

The combination of ASM alternatives would result in a lower level of ASM coverage relative to the No Action Alternative thereby resulting in a reduction in cost to sectors. A total coverage target of 14% is assumed to be the result of combining these options. This rate is an assumption because the actual implication of option 4A (the ELM exemption) has not been analyzed and so is unknown. Assuming NEFOP coverage of 4% for FY 2016, the ASM target coverage would be 10%. Assuming 20,000 days absent, and a cost of $710 per observed seaday, the cost of ASM to sectors would be $1.4 million (20,000*.10*$710). This would represent cost savings of $3.9 million relative to the No Action alternative. The $710 per observed seaday is based on NMFS cost estimates for the ASM program. If sectors are able to negotiate lower rates for ASM with service providers, the cost estimates in this section may be an overestimate. The estimate of total ASM cost from the Quota Change Model, assuming the new quotas from FW55 and a coverage rate of 10%, is $1.9 million dollars. This figure is based on a per pound of groundfish landed cost of $0.0273 and estimated groundfish landings from the model.

Management Measures for U.S. Georges Bank Cod TACs

- *Preferred Alternative- Option 2: Distribution of U.S. TACs for Eastern/Western Georges Bank Cod*

The economic impacts of Option 2 would be positive relative to No Action. Option 2 would provide added operational flexibility to sectors that have excess Eastern Georges Bank (EGB) cod ACE and are in need of Western Georges Bank (hereafter GB cod) ACE in order for its members to continue fishing on the Western portion of Georges Bank. Given the sizable decreases in the revised ACL for GB cod in FY2016, the ability of sectors to convert their EGB cod ACE may be of critical importance for allowing their members to maintain fishing operations on Georges Bank throughout FY2016. In the absence of available ACE for GB cod, sector members are not permitted to fish on Inshore Georges Bank (BSA 2) or

Offshore Georges Bank (BSA 3). Table 120provides breakdown of the highest revenue-grossing species per fishing year from sector groundfish trips within these statistical areas during FYs 2010-2014.

Modification to the Gulf of Maine Cod Protection Measures

- *Preferred Alternative- Option 2: Change in Authority to Modify GOM Cod Recreational Limits*

The economic impacts of Option 2 would vary based on future management actions taken. If the Regional Administrator (RA) were to set a possession limit on GOM cod of zero for FY 2016, then Option 2 would have neutral impacts relative to No Action. If however the RA were to set a possession limit on GOM cod greater than zero, then Option 2 would yield positive impacts to the recreational fishery relative to No Action in FY 2016. The magnitude of these impacts is difficult to predict. It is unclear how many more recreational trips would be taken if there was some allowance on the possession of GOM cod in FY 2016, but simulation results under various suites of regulations indicate a non-negligible increase in the number of trips in FY 2016 with a cod bag limit of 1 (Table 121).

If the possession limit on GOM cod were to be set above zero and GOM cod mortality in FY 2016 remains below the recreational sub-ACL, then the long term impacts of Option 2 would be positive as well. Table 121shows that a cod possession limit of one would be likely to keep GOM cod mortality below the recreational sub-ACL in the RAP recommendation Option, as well as in Options 6, 7, 9, and 11. For all Options presented, haddock mortality is predicted to remain under the recreational sub-ACL 100% of the time. The likelihood of cod mortality remaining below the recreational sub-ACL decreases when the open season occurs during Wave 3 compared to Wave 4, all else held equal. A change in the cod size limit from 24” to 23” also causes a sizable decrease in the probability of remaining below the sub-ACL.

Option 12 shows that a 23” cod size limit combined with a long haddock open season and no possession limit on haddock would keep cod mortality under the ACL less than 50% of the time, making it not a viable choice. Option 14, with a two wave season for cod, also would not be a viable choice. If GOM cod mortality in the recreational fishery were to exceed the sub-ACL, then the long term impacts of Option 2 may be negative. Overfishing would not only jeopardize the likelihood of higher possession limits for the recreational fishery in fishing years beyond 2016, but could also negatively affect the long term harvest of the commercial fishery.

8.11.1.5 Determination of Significance

The purpose of EO 12866 is to enhance planning and coordination with respect to new and existing regulations. This EO requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be “significant.” As stated in this EO, “significant regulatory action” means any regulatory action that is likely to result in a rule that may:

> *(1) 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, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;*
>
> *(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;*
>
> *(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or*

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive order.

The preferred alternatives for Framework Adjustment 55 to the Northeast Multispecies FMP are expected to negatively impact members of the groundfish fishery. The revised ACLs are predicted to result in a roughly $5 million reduction in groundfish revenues to the sector-based fishery relative to FY 2015. Certain components of the fishery, primarily vessels home-ported in Southern New England, may be more adversely affected than others. The Proposed Action is not however expected to result in impacts of $100 million to the economy and it is not determined to be significant under EO 12866 guidelines.

8.11.2 Initial Regulatory Flexibility Act

8.11.2.1 Introduction

The purpose of the Regulatory Flexibility Analysis (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct an Initial Regulatory Flexibility Analysis (IRFA) for each proposed rule. The IRFA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An IRFA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the RIR, the IRFA provides: 1) A description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; and, 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule.

8.11.2.2 Description of reasons why action by the Agency is being considered

The need and purpose of the actions are set forth in Section 3.2 of this document and are incorporated herein by reference.

8.11.2.3 Statement of the objectives of, and legal basis for, the proposed rule

The goals and objectives of FW55 are the same as those detailed in Amendment 16 to the Northeast Multispecies Fishery FMP. Framework 55 (FW55) is intended to incorporate status changes for groundfish stocks, set specifications for several groundfish stocks, update fishery program administration, and adjust management measures for commercial and recreational fisheries that catch groundfish stocks. This framework incorporates the results of new stock assessments into the setting of specifications, including catch limits for the U.S./Canada Resource Sharing Understanding and the distribution of ACLs to various components of the fishery. FW 55 would also implement an additional sector for operation in FY2016, change the process for approving new sectors, change the definition of the Haddock Separator Trawl, and modify the sector ASM program, the GOM cod protection measures, and the management measures for U.S. Georges Bank Cod TACs.

8.11.2.4 Description and estimate of the number of small entities to which the proposed rule will apply

Small entities include "small businesses," "small organizations," and "small governmental jurisdictions." The Small Business Administration (SBA) has established size standards for all major industry sectors in the U.S. including commercial finfish harvesters (NAICS code 114111), commercial shellfish harvesters (NAICS code 114112), other commercial marine harvesters (NAICS code 114119), for-hire businesses (NAICS code 487210), marinas (NAICS code 713930), seafood dealers/wholesalers (NAICS code 424460), and seafood processors (NAICS code 311710). A business primarily involved in finfish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $20.5 million for all its affiliated operations worldwide. For commercial shellfish harvesters, the other qualifiers apply and the receipts threshold is $5.5 million. For other commercial marine harvesters, for-hire businesses, and marinas, the other qualifiers apply and the receipts threshold is $7.5 million. A business primarily involved in seafood processing is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual employment, counting all individuals employed on a full-time, part-time, or other basis not in excess of 500 employees[27] for all its affiliated operations worldwide. For seafood dealers/wholesalers, the other qualifiers apply and the employment threshold is 100 employees. A small organization is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. Small governmental jurisdictions are governments of cities, boroughs, counties, towns, townships, villages, school districts, or special districts, with population of fewer than 50,000.

Ownership entities in regulated commercial harvesting businesses

This proposed action regulates recreational party/charter fishing businesses as well as commercial fish harvesting entities engaged in the Northeast multispecies limited access fishery, the small mesh multispecies fishery, the herring mid-water trawl fishery and the scallop fishery, since the Northeast Multispecies FMP allows for sub-allocations of regulated groundfish stocks for the purposes of bycatch in other fisheries. A description of the specific entities that are likely to be impacted is included below for informational purposes, followed by a discussion of those regulated entities likely to be impacted by the proposed regulations. For the purposes of the RFA analysis, the ownership entities, not the individual vessels, are considered as regulated entities.

[27] In determining a concern's number of employees, SBA counts all individuals employed on a full-time, part-time, or other basis. This includes employees obtained from a temporary employee agency, professional employee organization or leasing concern. SBA will consider the totality of the circumstances, including criteria used by the IRS for Federal income tax purposes, in determining whether individuals are employees of a concern. Volunteers (i.e., individuals who receive no compensation, including no in-kind compensation, for work performed) are not considered employees. Where the size standard is number of employees, the method for determining a concern's size includes the following principles: (1) the average number of employees of the concern is used (including the employees of its domestic and foreign affiliates) based upon numbers of employees for each of the pay periods for the preceding completed 12 calendar months; (2) Part-time and temporary employees are counted the same as full-time employees. [*PART 121—SMALL BUSINESS SIZE REGULATIONS §121.106*]

Individually-permitted vessels may hold permits for several fisheries, harvesting species of fish that are regulated by several different fishery management plans, even beyond those impacted by the proposed action. Furthermore, multiple permitted vessels and/or permits may be owned by entities affiliated by stock ownership, common management, identity of interest, contractual relationships, or economic dependency. For the purposes of this analysis, ownership entities are defined by those entities with common ownership personnel as listed on permit application documentation. Only permits with identical ownership personnel are categorized as an ownership entity. For example, if five permits have the same seven personnel listed as co-owners on their application paperwork, those seven personnel form one ownership entity, covering those five permits. If one or several of the seven owners also own additional vessels, with sub-sets of the original seven personnel or with new co-owners, those ownership arrangements are deemed to be separate ownership entities for the purpose of this analysis.

Ownership entities are identified on June 1st of each year based on the list of all permit numbers, for the most recent complete calendar year, that have applied for any type of Northeast Federal fishing permit. The current ownership data set is based on calendar year 2014 permits and contains gross sales associated with those permits for calendar years 2012 through 2014.

As of June 1, 2014 there were 1,056 commercial business entities potentially regulated by the proposed action. These entities participate in or are permitted for the northeast multispecies, small mesh multispecies, herring mid-water trawl and scallop fisheries. Of these, 1,056 entities are classified as small businesses. There are 359 entities that are primarily engaged in fishing for finfish (that is, obtain the greatest amount of their 2014 gross sales from sales of finfish) and all are classified as small businesses (average gross revenues from 2012-14 are less than $20.5 million). There are 466 entities that are primarily engaged in fishing for shellfish, and 448 of these are classified as small businesses (average gross revenues from 2012-14 are less than $5.5 million) (Table 137 and Table 138).

Table 137 - Entities regulated by the proposed action

Type	Number	Number small
Primarily finfish	359	359
Primarily shellfish	466	448
Primarily For Hire	94	94
No Revenue	137	137
Total	**1,056**	**1,038**

Table 138 - Description of regulated entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50k	319	319	$10,037	$1,285	1.2	30
$50-100k	91	91	$75,818	$78,079	1.3	4
$100-500k	298	298	$242,808	$218,714	1.3	4
$500k-1mil	145	145	$739,312	$731,295	1.6	7
$1-5.5mil	183	181	$1,931,886	$1,546,932	2.0	11
$5.5-20.5mil	17	4	$10,087,095	$7,383,522	10.2	28
$20.5mil+	3	0	$21,951,941	$21,893,630	15.7	16

Directly regulated groundfish harvesting entities

While 1,056 commercial entities are potentially regulated by the proposed action, not all of these entities derive a substantial portion of their gross sales in fisheries that are likely to be meaningfully impacted by the proposed action. In the case of commercial harvesters, the proposed action will directly impact entities engaged in the limited access groundfish fishery the most. The limited access groundfish[28] fisheries are further sub-classified as those enrolled in the sector allocation program and those in the common pool. Sector vessels are subject to sector-level stock-specific Annual Catch Entitlements (ACE) that limit catch of allocated groundfish stocks. Accountability measures (AMs) include a prohibition on fishing inside designated areas once 100 percent of available Sector ACE has been caught, as well as area-based gear and effort restrictions that are triggered when catch of non-allocated groundfish stocks exceed Allowable Catch Limits (ACLs). Common pool vessels are subject to various days-at-sea and trip limits designed to keep catches below ACLs set for vessels enrolled in this program. In general, sector-enrolled businesses rely more heavily on sales of groundfish species than common pool-enrolled vessels. All limited access multispecies permit holders are eligible to participate in the sector allocation program, however many permit holders select to remain in the common pool fishery as a result of low catch histories and in turn, low Potential Sector Contributions (PSC) for groundfish stocks. As of May 1, 2015 (beginning of fishing year 2015) there were 1,068 individual limited access permits[29]. 627 of these permits were enrolled in the sector program and 441 were in the common pool. Of these 1,068 limited access multispecies permits, 717 had landings of any species and 273 had groundfish landings from at least one groundfish trip in FY 2014.

Potentially impacted regulated commercial groundfish fishing entities

As of June 1, 2015 there were 661 commercial business entities potentially regulated by the proposed action. These entities are permitted to operate in the northeast multispecies limited access fishery (as of June 1, 2015 there were 1,147 individual limited access permits[30]). 649 of these entities are classified as small businesses. 315 entities are primarily engaged in fishing for finfish (that is, obtain the greatest amount of their 2014 gross sales from sales of finfish) and all are classified as small businesses (average gross revenues from 2012-14 are less than $20.5 million). 237 entities are primarily engaged in fishing for shellfish, and 225 of these are classified as small businesses (average gross revenues from 2012-14 are less than $5.5 million). The 39 for hire businesses included here are entities affiliated with limited access commercial groundfish permits, but derive greater than 50% of their gross sales from party/charter operations. All are small businesses (average gross revenues from 2012-14 are less than $7.5 million). The remaining 75 entities had no revenue and are classified as small (Table 137 and Table 138).

Table 139 - Entities regulated by the proposed action

Type	Number	Number small
Primarily finfish	315	315
Primarily shellfish	237	225
Primarily for hire	34	34
No Revenue	75	75
Total	**661**	**649**

[28] The species managed under the Northeast multispecies FMP are commonly referred to as groundfish.

[29] For purposes of this analysis, groundfish limited access eligibilities held as Confirmation of Permit History (CPH) are not included because although they may generate revenue from ACE leasing, they do not generate any gross sales from fishing activity and thus would not be classified as commercial fishing entities.

[30] For purposes of this analysis, groundfish limited access eligibilities held as Confirmation of Permit History (CPH) are not included because although they may generate revenue from ACE leasing, they do not generate any gross sales from fishing activity and thus would not be classified as commercial fishing entities.

Table 140 - Description of regulated entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50K	186	186	$10,597	$1,954	1.3	30
$50-100K	71	71	$76,466	$78,736	1.3	3
$100-500K	225	225	$244,672	$219,731	1.3	4
$500K-1mil	91	91	$734,423	$720,668	1.7	7
$1-5.5mil	74	73	$1,899,461	$1,498,138	2.4	11
$5.5mil+	14	3	$11,900,790	$7,383,522	12.4	28

These totals may mask some diversity among the entities. Many, if not most, of these ownership entities maintain diversified harvest portfolios, obtaining gross sales from many fisheries and not dependent on any one. However, not all are equally diversified. Those that depend most heavily on sales from harvesting species impacted directly by the proposed action are most likely to be affected. By defining dependence as deriving greater than 50% of gross sales from sales of regulated species associated with a specific fishery, we are able to identify those ownership groups most likely to be impacted by the proposed regulations[31]. Using this threshold, 61 entities are groundfish-dependent, all of which are small and all but one are finfish commercial harvesting businesses (Table 141).

[31]Charter/party vessels are prohibited from selling fish though some ownership entities may have recreational and commercial permits. Entities designated as charter businesses derive the largest part of their gross sales from for-hire fees from passengers.

Table 141 – Description of groundfish dependent impacted regulated commercial groundfish entities by gross sales

Sales	Number of entities	Number of large businesses	Average number of fishing permits owned per entity	Maxi-mum fishing permits per entity	Median gross sales per entity	Mean gross sales per entity	Median groundfish sales per entity	Mean groundfish sales per entity
<$50K	6	0	1.0	1	$10,116	$20,316	$8,831	$16,476
$50-100K	7	0	1.1	2	$72,052	$67,390	$56,221	$49,341
$100-500K	22	0	1.6	4	$226,938	$240,833	$116,018	$172,331
$500K-1mil	13	0	1.2	2	$698,226	$718,231	$398,548	$491,838
$1-5.5mil	13	0	2.2	4	$1,553,597	$1,854,052	$1,292,445	$1,403,896
Total ownership entities	**61**	**0**						

Regulated Scallop Fishing Entities

If scallop vessels exceed their sub-allocation of SNE/MA yellowtail flounder bycatch and either the total SNE/MA yellowtail flounder ACL is exceeded or the scallop fishery exceeds its ACL by 50 percent or more, SNE/MA yellowtail AMs for that stock will go into effect the following FY. Because the proposed action will decrease the available SNE/MA yellowtail flounder ABC for the groundfish fishery, vessels permitted in the scallop fishery are technically regulated by this action.
The limited access scallop fisheries are further sub-classified as Limited Access (LA) scallop permits and Limited Access General Category (LAGC) scallop permits. LA scallop permit businesses are subject to a mixture of days-at-sea (DAS) and dedicated area trip restrictions. LAGC scallop permit businesses are able to acquire and trade LAGC scallop quota and there is an annual cap on quota/landings. In 2014, there were 169 distinct ownership entities. Of these, 154 are categorized as small and 15 are categorized as large entities under the SBA guidelines (Table 142 and Table 143)[32].

Table 142 - Description of impacted regulated scallop fishing entities by business type and size

Business	Number entities	Number small entities
Primarily finfish	3	3
Primarily shellfish	166	151
Total	169	154

Table 143 - Description of impacted scallop fishing entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
$100-500K	39	39	$ 776,647	$ 771,638	1.3	3
$1-5.5mil	114	112	$ 1,934,136	$ 1,498,972	1.8	11
$5.5mil+	16	3	$ 11,631,670	$ 7,383,522	11.3	28

Regulated Small-Mesh Multispecies Fishing Entities

FW 48 created the small-mesh multispecies fishery sub-ACL for GB yellowtail flounder and FW 51 adopted a gear-based AM. If the small-mesh sub-ACL for GB yellowtail flounder is exceeded, a gear-based AM will go into effect at the start of the next fishing year. Additionally if the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement. Because the proposed action will decrease the available GB yellowtail flounder ABC for the groundfish fishery, vessels permitted in small mesh fisheries are technically regulated by this action.

The small-mesh exempted fishery allows vessels to harvest species in designated areas using mesh sizes smaller than the minimum mesh size required by Regulated Mesh Area (RMA) regulations. To participate in the small-mesh multispecies (whiting) exempted fishery, vessels must hold either a limited access multispecies permit (categories A-F) or an open access multispecies permit (category K). Limited access multispecies permit holders can only target whiting when not fishing under a DAS and while declared out

[32] The number of scallop entities reported in Table 7 and 8 is slightly lower than the numbers reported in the RFA analyses for Atlantic Sea Scallop Framework Adjustment 26 due to the different cut-off dates used in determining permits. Tables 7 to 8 uses June 1, 2014 as the cut-off date to determine the number of entities, while the Atlantic Sea Scallop Framework included all the vessels with landings of scallops if they had a permit in the corresponding fishing years.

of the fishery using VMS. In 2014, there were 1,007 distinct ownership entities. Of these, 990 are categorized as small and 17 are categorized as large entities per the SBA guidelines ().

Table 144 - Description of impacted regulated small-mesh multispecies fishing entities by business type and size

Business	Number entities	Number small entities
Primarily finfish	358	358
Primarily shellfish	418	401
Primarily for hire	94	94
No revenue	137	137
Total	1,007	990

Table 145 - Description of impacted regulated small-mesh multispecies fishing entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50k	319	272	$10,037	$7,658	1.2	30
$50-100k	91	55	$75,818	$78,079	1.3	4
$100-500k	296	148	$242,256	$218,760	1.3	4
$500k-1mil	133	68	$733,417	$731,295	1.6	7
$1-5.5mil	149	44	$1,950,507	$1,547,906	2.1	11
$5.5-20.5mil	15	2	$10,441,790	$6,746,447	11.1	28
$20.5mil+	3	0	$21,951,941	$21,893,630	15.7	16

Regulated Active Small-Mesh Multispecies Fishing Entities

Active small-mesh multispecies fishing entities are defined as those landing whiting, and are a subset of those described in the previous section. In 2014, there were 223 distinct ownership entities. Of these, 221 are categorized as small and two are categorized as large entities per the SBA guidelines (and).

Table 146 - Description of impacted regulated active small-mesh multispecies fishing entities by business type and size

Business	Number entities	Number small entities
Primarily finfish	167	167
Primarily shellfish	56	54
Total	223	221

Table 147 - Description of impacted regulated active small mesh multispecies fishing entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50k	14	9	$32,699	$34,510	1.1	2
$50-100k	14	12	$74,560	$74,041	1.3	2
$100-500k	94	75	$264,704	$260,657	1.3	4
$500k-1mil	58	41	$746,855	$743,517	1.8	7
$1-5.5mil	39	28	$2,938,097	$1,641,882	2.1	6
$5.5mil+	4	2	$11,742,193	$16,551,746	15.8	28

Regulated Herring Fishing Entities

FW 46 created separate MWT sub-ACLs for GB haddock and GOM haddock equal to 1% of the respective ABCs. Because the proposed action will increase the available GOM and GB haddock ABC for the groundfish fishery, vessels permitted in the Atlantic herring fishery are technically regulated by this action. In the event that the MWT herring fishery exceeds their sub-allocation of haddock for either stock, harvesting restrictions in GB and GOM AM areas for herring will go into effect and the total amount of the overage will be deducted from the following fishing year's sub-ACL as well.

In 2014, there were 63 distinct ownership entities. Of these, 57 are categorized as small and six are categorized as large entities per the SBA guidelines (Table 148 and Table 149).

Table 148 - Description of impacted regulated herring fishing entities by business type and size

business	Number entities	Number small entities
Primarily finfish	39	39
Primarily shellfish	24	18
Total	63	57

Table 149 - Description of impacted herring fishing entities by gross sales

Sales category	Number	Number small	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$1mil	28	28	$ 568,867	$ 712,442	1.5	5
$1-5.5mil	27	27	$ 2,256,079	$ 2,291,509	1.9	6
$5.5mil+	8	2	$14,036,718	$ 14,482,327	14.1	28

8.11.2.5 Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

The proposed rules in FW 55 are not expected to create any additional reporting, record-keeping or other compliance requirements.

8.11.2.6 Identification of all relevant Federal rules, which may duplicate, overlap, or conflict with the proposed rule

No relevant Federal rules have been identified that would duplicate or overlap with the proposed action.

8.11.2.7 Significance of economic impacts on small entities

Substantial number criterion

In colloquial terms, substantial number refers to "more than a few." The vast majority of the regulated entities impacted by this action are considered small, and this proposed measure will impact some of them in a negative way.

Significant economic impacts

The outcome of "significant economic impact" can be ascertained by examining two factors: disproportionality and profitability.

- Disproportionality refers to whether or not the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities.

- Profitability refers to whether or not the regulations significantly reduce profits for a substantial number of small entities.

8.11.2.8 Description of impacts on small entities

This IRFA analysis is intended to analyze the impacts of the alternatives described in Section 4.0 on small entities. These measures are expected to negatively impact gross sales of small entities regulated by this action. The vast majority (1,038 out of 1,056) of potentially regulated entities are classified as small businesses by SBA business size standards.

Impacts to groundfish-dependent small entities

Of these 1,056 entities, 661 entities derive gross sales, or may derive gross sales from, the limited access groundfish fishery and are likely to be impacted by the proposed action. Of these, 649 entities are considered small businesses. There are 61 entities that are directly regulated and dependent on the groundfish fishery for greater than 50% of their gross sales. All of these entities are considered small.

Therefore, this action can be expected to adversely affect the gross sales and profits of small businesses to a greater degree than large businesses, as the large businesses identified here are:
- more diversified as all, except 1, are classified as primarily shellfish and not finfish businesses; and
- less dependent upon the commercial groundfish fishery for a substantial portion of their revenue, as all 61 entities obtaining more than 50% of their gross sales are classified as small businesses.

Analytical techniques used to develop impact analyses of the proposed action (see Section 8.2 and Section 8.11) do not detect gross sales and/or profit changes at the individual entity level. However, for the reasons noted above, the anticipated $7.5 million aggregate gross revenues losses from the FW55 ACLS are expected to be absorbed primarily by small businesses (see Table 107).While profits for nearly all of these small entities are expected to be adversely affected by the proposed action (see, again, Section 4.0), commercial groundfish fishery gross revenues reductions are predicted to be approximately 10% relative to the baseline of FY 2015.

FW55 includes alternatives with different ASM coverage rates. The costs associated with these alternatives range from $1.3 million to $4.5 million. For the past six fishing years, i.e, since when sectors were first implemented, NOAA/NMFS has paid for ASM coverage. It is expected that industry will soon be required to pay these costs. While this is not a requirement of FW55, the costs associated with the various levels of coverage are analyzed in FW55 due to the fact that FW55 proposes to reduce ASM coverage rates from the No Action alternative. So while assuming the cost of any ASM rate greater than 0% would be new to industry, some of the alternatives in FW55 are designed to minimize these costs.

Impacts to scallop-dependent small entities
Under Option 2, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder is expected to decrease from 66 mt in FY2015 to 32 mt in FY2016, a decrease of 48.5%. Actual catches were 48.6 mt in FY2013, 63 mt in FY 2014, and are projected to be 54 mt in FY2015. Accountability measures were not triggered in FYs 2013 and 2014 and are not projected to be triggered in FY 2015 (see Scallop PDT Memo to Groundfish PDT, November 9, 2015). With a sub-ACL of 31 mt in FY 2016 and catch projections in FY 2015 and actual catches in FY 2014 that exceed 46.5 mt (150% of 31 mt), there is a strong possibility that accountability measures will be triggered. Should accountability measures be triggered for SNE/MA yellowtail flounder in the scallop fishery, then the activity of scallop vessels would be curtailed and revenues from scalloping would be reduced. The extent of revenue reduction from the presence of AMs, which would be implemented in FY 2017, is uncertain at this time.

Under Option 2, the sea scallop fishery sub-ACL for SNE/MA windowpane flounder is expected to increase from 183 mt in FY2015 to 209 mt in FY2016, an increase of 14.2%. Actual catches were 129.1 mt in FY 2013, 136 mt in FY 2014, and were projected to be 134 mt in FY2015. As of November 2015, catch was 139 mt, though it is not expected that catch will exceed 183 mt (see Appendix I). Given these recent conditions, it is not likely that the scallop fishery would be functionally limited by a SNE/MA windowpane flounder sub-ACL of 209 mt in FY2016.

GB yellowtail flounder AMs were developed for the sea scallop fishery in Amendment 15 to the Atlantic Sea Scallop FMP, and later modified in FW23. The scallop fishery is subject to an AM in the following fishing year if scallop vessels participating in either open- area or access-area trips exceed their sub-allocation of GB yellowtail flounder, and either the total GB yellowtail flounder ACL is exceeded or the scallop fishery exceeds its ACL by 50 percent or more. The length of the AM area closures is determined by the overage percent. If the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement.

Under Option 2, the sea scallop fishery sub-ACL for GB yellowtail flounder is expected to increase from 38 mt in FY2015 to 42 mt in FY2016, an increase of 10.5%. Actual catches were 37.5 mt in FY 2013, 59 mt in FY2014, and are projected to be as high as 49.6 mt in FY2015. Accountability measures were not triggered in FYs 2013 and 2014 and are not projected to be triggered in FY 2015. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (24.5% in FY14; 36.1% in FY13; 58.5% in FY12) suggests that the total ACL is unlikely to be exceeded in FY 2016, even if the sub-ACL in the scallop fishery is. This means that the likely threshold of GB yellowtail flounder catch to trigger scallop fishery AMs would be 63 mt (150% of 55 mt) under Option 2. The projected bycatch of GB yellowtail flounder bycatch by the scallop in FY 2016 is between 27.9 and 49.6mt (see Appendix I). Therefore, while the sub-ACL of 42mt may be exceeded, the likely threshold of 63mt to trigger AMs is not expected to be reached. If GB yellowtail flounder bycatch does exceed the projections, the scallop fishery could be negatively impacted by AMs.

Impacts to herring-dependent small entities
Option 2 would have positive impacts on the Atlantic herring fishery relative to No Action and FY 2015. The sub-ACLs for GB haddock and GOM haddock would be increased from FY 2015 under Option 2. The GB haddock sub-ACL would be increased from 227mt to 521mt and the GOM haddock sub-ACL would be increased from 14mt to 34mt. These increased sub-ACLs should provide a better opportunity for the Atlantic herring fishery to avoid triggering AMs, which the herring fishery is operating under for exceeding the sub-ACL for GB haddock in-season from October 22, 2015 until the end of the 2015 groundfish fishing year. These AMs implemented a 2,000 lb. possession limit for most of the GB stock area, resulting in revenue decreases for the Atlantic herring fishery.

Since AMs are in effect in FY2015, the following information is provided to illustrate the benefits of decreasing the risk of trigging the AMs in FY2016. To estimate the loss in revenue from the FY 2015 AMs, average annual Atlantic herring revenue from herring trips to statistical areas currently under AMs (521, 522, 525, 561, and 562) for the months of November-April during FYs 2011-2014 was calculated. Table 116 shows that average herring revenue from these stat areas during this six month duration is nearly $2,000,000. The average volume of herring landings on the considered trips was slightly over 360,000 pounds (16,664,386/46), 180 times the 2,000 lb. legal possession limit under the AMs.

Table 150 - Atlantic herring trips, landings, and revenue from statistical reporting areas 521, 522, 525, 561, or 652 from November through April during groundfish FY 2011 – 2014. Trip locations from VTRs.

Groundfish Fishing Year	# of Herring Trips (In stat areas 521, 522, 525, 561, or 562 during Nov-Apr)	Herring Landed	Herring Revenue (2010 $)
2011	27	10,320,385	$1,112,396
2012	43	11,934,138	$1,498,469
2013	69	27,199,795	$2,859,290
2014	38	16,283,224	$1,731,738
Avg. 2011-2014	44	16,434,386	$1,800,473

The AMs, in place to limit incidental catch of GB haddock in FY 2015, likely offer no long term economic benefit to the groundfish fishery at this point. The GB haddock stock is well above B_{MSY} and utilization rates have been low in recent fishing years. During May-October 2015, incidental catch of GB haddock by the Atlantic herring fishery totaled 291 mt. This number is more or less insignificant when considering the commercial groundfish sub-ACL for GB haddock is nearly 22,000 and utilization rates in recent fishing years have been well below 50%.

Impacts to small-mesh multispecies small entities
Option 2 would have negative impacts on the small mesh fishery relative to No Action. The sub-ACL for GB yellowtail flounder in the small mesh fishery would be decreased from the FW53 specifications from 7mt to 5mt. Under Option 2, the sub-ACL in FY 2016 would be the same as the 2015 value (5 mt). While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage.

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 BMSY and FMSY 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.

BMSY: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to FMSY. For most stocks, BMSY is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ BMSY, depending on the species.

Bthreshold: 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 Bthreshold. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve Btarget as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, Bthreshold is often defined as either 1/2BMSY or 1/4 BMSY. Bthreshold is also known as Bminimum.

Btarget: A desirable biomass to maintain fishery stocks. This is usually synonymous with BMSY 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 (BMSY or proxy) as a management objective. The biomass threshold (Bthreshold or Bmin) 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).

F0.1: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

FMAX: a fishing mortality rate that maximizes yield per recruit. FMAX is less conservative than F0.1.

FMSY: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

Fthreshold: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses FMSY or FMSY proxy for Fthreshold. 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. A50 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. L25 is the length where 25% of the fish encountered are retained by the mesh. L50 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 Bthreshold (defines overfished) and Fthreshold (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). BMSY 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, FMSY, BMSY, 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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