Framework Adjustment 48
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

Initial Framework Meeting: June 21, 2012
Final Framework Meeting: December 20, 2012
Date Submitted: February 26, 2013

1.0 Executive Summary

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (M-S Act). The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts. The FMPs have been updated through a series of amendments and framework adjustments. The most recent multispecies amendment, published as Amendment 16, was submitted for review by the National Marine Fisheries Service in October 2009 and became effective on May 1, 2010. This amendment adopted a broad suite of management measures in order to achieve fishing mortality targets and meet other requirements of the M-S Act. Included in Amendment 16 was a process for setting specifications for the fishery and updating measures through framework actions. Framework 44 to the FMP set specifications for fishing years (FY) 2010-2012. It became effective concurrently with Amendment 16 on May 1, 2010. Framework 45 modified several management measures to improve administration of the fishery and revised several specifications; it was implemented May 1, 2011. Framework 46 was implemented September 14, 2011 and modified the provisions that restrict mid-water trawl catches of haddock. Framework Adjustment 47 was implemented May 1, 2012 and adjusted ACLs and other management measures. This framework would provide additional modifications to the management program. 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 made major changes to the FMP. For several groundfish stocks, the mortality targets adopted by Amendment 16, and the resulting specifications in Framework 44, represented substantial reductions from existing levels. For other stocks, the mortality targets were at or higher than existing levels and mortality could remain the same or even increase. Because most fishing trips in this fishery catch a wide range of species, it is impossible to design effort control measures that will change mortality in a completely selective manner for individual species. The management measures adopted by Amendment 16 to reduce mortality where necessary were also expected to reduce fishing mortality unnecessarily on other, healthy stocks. As a result of these lower fishing mortality rates, yield from healthy stocks could be sacrificed and the management plan may not provide optimum yield - the amount of fish that will provide the greatest overall benefit to the nation. Amendment 16 created opportunities to target these healthy stocks. The FMP allows vessels with groundfish permits to either fish under the days-at-sea (DAS) effort control system or to join sectors, which are small groups of self-selected fishermen that receive an allocation of annual catch entitlement (ACE) based upon the catch history of each member. Most groundfish fishing activity occurs within these sectors. The Amendment also adopted a system of Annual Catch Limits (ACLs) and Accountability Measures (AMs) that are designed to ensure catches remain below desired targets.

This framework action would continue to improve management of the fishery. It incorporates the results of new stock assessments into the setting of specifications and selection of rebuilding strategies. It also makes several modifications to the administration of Accountability Measures (AMs). This framework would also modify measures from Amendment 16 regarding industry funded at-sea monitoring, and would evaluate various measures that may minimize economic impacts on the fleet caused by reductions in short-term allocations. These measures are modifications to the minimum fish size requirements and access to the year round closed areas.

The *need* for this action is to modify management measures in order to that overfishing does not occur, to modify observer coverage levels, to modify management measures regulating the at sea monitoring program and to modify management measures to mitigate negative economic impacts. There are several *purpose*s: to revise status determination criteria, to adopt specifications, to adopt measures for the U.S./Canada Total Allowable Catches (TACs), to modify management measure for the recreational fishery, to modify monitoring programs and funding, to allow sectors to request exemptions from year round closed areas, to modify management measures for minimum fish size requirements, and to modify AMs.

Proposed Action

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

The Preferred Alternatives include:

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

    - *Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder and white hake.* These changes would incorporate the results of recent assessments into the management program and would be used for setting catch levels.

    - *SNE/MA Windowpane Flounder Sub-ACLs:* A sub-ACL would be allocated to the scallop fishery based on the 90th percentile of the scallop fishery catches from 2001 through 2010; a sub-ACL for the other fisheries would be established to make it possible to adapt an AM.

    - *GB Yellowtail Flounder Scallop Sub-ACL*: The scallop sub-ACL for GB yellowtail flounder would be specified as a fixed percentage of the U.S. ABC.

    - *GB Yellowtail Flounder Small-Mesh Fisheries Sub-ACL:* A sub-ACL for the small-mesh fisheries would be established based on the median small-mesh fisheries catches of GB yellowtail flounder from 2004 through 2011.

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

    - *Management Measures for the Recreational Fishery:* The modification of the AM for the recreational fishery would allow proactive measures to be implemented if necessary.

    - *Groundfish Monitoring Program:* This would provide clarification of the goals and objections of the at-sea monitoring program. The CV Standard would be met for each stock at the overall stock level. Industry would not be required to fund the at-sea monitoring program in FY 2013. A lower at-sea monitor coverage rate would be applied for sector trips under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear; the coverage rate would be determined annually. The cost responsibility of at-sea monitoring for industry would be restricted to direct at-sea monitor costs; NMFS would continue to cover all other costs associated with at-sea monitoring. The dockside monitoring requirement would be eliminated.

    - *Commercial Fishery Minimum Size Restrictions:* Minimum size restrictions would be modified to reduce regulatory discards.

    - *GB Yellowtail Flounder Management Measures:* GB yellowtail flounder discards on groundfish trips would be calculated for two different areas.

    - *Sector Management Provisions – Allowed Exemption Requests*: Sectors would be allowed to request exemptions from the year round closed areas.

    - *Accountability Measures:* A number of changes would be made to the existing AMs. The timing of the AM for stocks not allocated to sectors would be changed; if accurate data are available the AM would be implemented in the year immediately following an overage. Area-based AMs would be adopted for SNE/MA winter flounder, Atlantic halibut and Atlantic wolfish stocks that would require the use of selective trawl gear and prohibit the use of sink gillnet and longline in defined areas if the ACLs are exceeded. Possession of Atlantic halibut would be prohibited if the ACL is exceeded. In the case of SNE/MA winter flounder, there would be no restrictions on longline or gillnet gear in the applicable areas but the use of selective trawl gear would be required. The AM for SNE/MA windowpane flounder would be modified to apply to two components of the ACL, both the groundfish and the other sub-components ACLs. Common pool vessels fishing with a HA or HB permit would not be restricted if an AM is triggered for white hake, a species that is rarely caught by these vessels.

    - *Trawl Gear Stowage Requirements*: Trawl vessels transiting closed areas would not have to stow their gear in the manner described by the Regional Administrator.

Summary of Environmental Consequences

The environmental impacts of all of the alternatives under consideration are described in Section 7.0. Biological impacts are described in Section 7.1, impacts on endangered and other protected species are described in Section 7.3, impacts on essential fish habitat are described in Section 7.2, the economic impacts are described in Section 7.4, and social impacts are described in Section 7.5. Cumulative effects are described in Section 7.6. Summaries of the impacts should the Proposed Action be based on the Preferred Alternatives are provided in the following paragraphs.

Biological Impacts

The measures that constitute the Proposed Action (if based on the Preferred Alternatives) are designed to achieve the rebuilding objectives for the Northeast Multispecies fishery. The most important biological impact of the proposed measures is that they would control fishing mortality on Northeast Multispecies stocks in order to prevent (or end) overfishing and rebuild overfished stocks. The adoption of additional sub-ACLs for GB yellowtail flounder and SNE/MAB windowpane flounder are the measures most likely to have positive biological impacts. These sub-ACLs, and the AMs that will be adopted as a result, will impose tighter controls on fishing mortality for these stocks. The preferred alternative changes to AMs would also contribute to achieving these objectives by providing better control of fishery catches. For example, the preferred alternative would modify recreational AMs so that measures can be changed in advance of an overage, making it less likely that an overage will occur.

Essential Fish Habitat (EFH) Impacts

No significant adverse impacts on EFH are expected to result from the Proposed Action (if based on the Preferred Alternatives). Impacts are expected to be neutral. The impacts of opening the closed areas were considered; it is difficult to predict the potential outcomes of sector exemption requests but they are not considered to adversely affect EFH areas, in part because areas identified as EFH areas will remain closed.

Impacts on Endangered and Other Protected Species

None of the Preferred Alternatives in Framework 48 are likely to produce impacts to protected species beyond those described in previous regulations. As with EFH, the impacts are not quantifiable but are expected to be neutral and, in some circumstances, beneficial as a result of groundfish monitoring program revisions and changes to Accountability Measures.

Economic Impacts

The economic impacts of the Preferred Alternative measures on the groundfish fishery are considered to be neutral. The revisions to the AMs may cause short-term economic losses if they are triggered but over the long-term the industry should benefit from keeping catches under target levels. Changes to the administration of the scallop fishery sub-ACLs, the establishment of SNE/MA windowpane flounder sub-ACLs, the revisions to the AMs would be expected to benefit the groundfish fishery in the long-term by making more likely that mortality targets will be achieved. The effects of revisions to the at sea monitoring program have the capacity to cause negative impacts to the fishery, however, some benefits would also occur reducing negative impacts and potentially providing some long-term benefits overall. Sector exemption requests can provide benefits to the fishery, particularly if haddock catch can increase and provide additional revenue, however, the risk of entering the closed areas could negatively impact future productivity but the benefits and costs are highly uncertain.

Social Impacts
The Proposed Action (if based on the Preferred Alternatives) could have minor social impacts .

Cumulative Effects
The Proposed Action (if based on the Preferred Alternatives) is expected to have beneficial effects for managed resources. Updating fishery specifications, improving program administration, and modifying effort controls should increase the likelihood of achieving mortality targets and lead to increased stock sizes. The proposed measures are not expected to have substantial cumulative effects on non-target species, protected resources, or habitat (including essential fish habitat).

Alternatives to the Proposed Action

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

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

    - *Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder and white hake.* The No Action alternative would not update the status determination criteria for these stocks. Using the old criteria would not be consistent with recently completed assessments and would not comply with requirements to use the best available science. The white hake stock assessment will be completed in February 2013, however, the No Action alternative would result in no groundfish sub-ACL in FY2013 for this stock.

    - *SNE/MA Windowpane Flounder Sub-ACLs:* The No Action alternative would not distribute the ACL for SNE/MA windowpane flounder to other fisheries; the groundfish fishery would be held accountable for any overages in the ACL.

    - *GB Yellowtail Flounder Scallop Sub-ACL:* The No Action alternative would not change the basis for the scallop sub-ACL f or GB yellowtail flounder; the scallop allocation would need to be considered each time the scallop management program was established in a framework action.

    - *GB Yellowtail Flounder Small-Mesh Fisheries Sub-ACL:* The No Action alternative would not establish a sub-ACL for small-mesh fisheries and no AMs for the various small-mesh fisheries would be established. Small-mesh fishery catch has comprised an increasing percentage of GB yellowtail catch and this would not control catch by these fisheries.

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

    - *Management Measures for the Recreational Fishery:* The AM would remain reactive and would be implemented only after an overage of the sub-ACL was determined.

    - *Groundfish Monitoring Program:* The No Action alternative would maintain the goals and objectives for the at sea monitoring program as defined in Amendment 16 and subsequent frameworks. The requirement of industry funding established in Amendment 16 would remain in place, in addition to the dockside monitoring program.

    - *Commercial Fishery Minimum Size Restrictions:* The No Action alternative would not change the minimum size restrictions on allocated groundfish stocks. It would reduce catch of sub-adult fish but would not reduce regulatory discards.

    - *GB Yellowtail Flounder Management Measures:* The No Action alternative would not revise the discard strata for GB yellowtail flounder; this would not establish a separate discard rate for a strata with known lower GB yellowtail catch. Option 3 would require small-mesh fisheries to use modified gear that has not been tested in deep water.

    - *Sector Management Provisions – Allowed Exemption Requests*: The No Action alternative would continue to prohibit sectors from requesting exemptions from the year round closed areas. The closed areas would continue to address a number of management issues, however, would not provide the industry with additional fishing grounds during a time of low stock allocations.

    - *Accountability Measures:* The No Action alternative would maintain the timing of the AM implementation for stocks not allocated to sectors at year 3 after an overage is determined. No modifications to the existing AMs for Atlantic halibut, Atlantic wolffish, SNE/MA winter flounder or SNE/MA windowpane flounder would be made.

    - *Trawl Gear Stowage Requirements*: Trawl vessels transiting closed areas would be required to stow their gear in the manner described by the Regional Administrator.

Impacts of Alternatives to the Proposed Action

In many cases, the No Action alternatives would not have met current requirements of the M-S Act. Only the most significant impacts are highlighted below.

Biological Impacts

The biological impacts of the other alternatives that were considered would be most important for status determination criteria. The No Action alternative for status determination criteria would mean that the best available science would not be used. The No Action alternative for the recreational fishery measures could have some impact on GOM cod and GOM haddock as recreational catches could exceed the sub-ACL before changes were made to the measures. The accuracy of catch estimates from the No Action alternative for the at sea monitoring program varies in comparison to the Preferred Alternatives. The No Action alternative for the dockside monitoring program would provide more accurate landings data that would aid in stock assessments than the Preferred Alternative.

Essential Fish Habitat Impacts

Changes to status determination criteria and sub-ACL administration, are not usually expected to have direct impacts on EFH. As a result there may be little difference between the Preferred Alternatives and the other alternatives under consideration. The No Action alternative for sector exemption requests to the year round closed areas would not adversely affect EFH as they would remain largely closed. Overall, the indirect impacts of these alternatives would be expected to be minor. The alternatives for change to the commercial and recreational fishery would also be expected to have minor effects on EFH because large changes in fishing effort would not be expected to result from many of the measures.

Impacts on Endangered and Other Protected Species

The alternative to the Preferred Alternative for updates to SDCs would be expected to have minor or negligible impacts on endangered and other protected species. The No Action alternative for SNE/MA windowpane flounder sub-ACL administration would have the least impact on protected species when compared to the Preferred Alternatives. The No Action alternative for the scallop fishery sub-ACL for GB yellowtail flounder would retain flexibility in sub-ACL determination; whether the impacts of this would be positive or negative is unknown. The No Action alternative for the establishment of a small-mesh sub-ACL for GB yellowtail flounder could have negative impacts on protected species because it would not limit interactions between the fishery and protected species if there is an overage. The changes to the commercial and recreational fishery measures would not be expected not have large impacts on endangered and protected species; in many cases the impacts are dependent on any shifts in effort that results from a management measure.

Economic Impacts

When compared to the Preferred Alternative, the economic impacts of the No Action alternative are not as negative. The No Action alternative for the scallop fishery sub-ACL for GB yellowtail flounder would have the least impact on the scallop industry; it represents the status quo for the groundfish fishery and isn’t expected to have any new economic impact. The No Action alternatives for the commercial and recreational measures are not expected to have great economic impacts, with the exception of an industry funded at sea monitoring program. The future costs of such a program are difficult to predict and could have a strongly negative impact on the industry.

Social Impacts

The social impacts of adopting the No Action alternatives for status determination criteria would be negative as SDCs based on the GARM III assessment has the expectation that stocks will continue to decline. The No Action alternative that would not establish an additional sub-ACL for SNE/MA windowpane flounder for the scallop fishery would have mostly negative impacts. The No Action alternative for the basis for the scallop fishery sub-ACL for GB yellowtail flounder has relatively neutral impacts, however, the uncertainty in determining allocations for industry can negatively impact on the industry; the same applies for the small-mesh fisheries sub-ACL for GB yellowtail flounder. The No Action alternative for management measures for the recreational fishery could have neutral impacts; negative impacts could occur if the fishery doesn't reach the sub-ACL or if there is an overage. Revisions of the groundfish monitoring program would largely have no social impacts; if industry is required to pay for at sea monitoring may change revenues, which could have some social impact. The No Action alternative for minimum fish size requirements would not reduce discarding, which has a negative social impact. The No Action alternative that would not revise the discard strata for GB yellowtail flounder could negatively impact the industry if low allocations occur and the probability of exceeding the ACL increases. The No Action alternative that would not allow sectors to request exemptions to closed areas could negatively impact those members of sectors considering requesting an exemption. The No Acton alternative that would not alter the timing of AMs is considered to have little negative impact except if it creates resentment between various industry components and if a perceived misapplied regulation is maintained. The No Action alternative for trawl gear stowage is considered to have negligible negative social impacts because it would maintain a redundant requirement.

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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
CAI	Closed Area I
CAII	Closed Area II
CC	Cape Cod
CEQ	Council on Environmental Quality
CHOIR	Coalition for the Atlantic Herring Fishery's Orderly, Informed, and Responsible Long-Term Development
CPUE	Catch per unit of effort
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAM	Dynamic Area Management
DAP	Domestic Annual Processing
DAS	Days-at-sea
DEA	Data Envelopment Analysis
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DSEIS	Draft Supplemental Environmental Impact Statement
DSM	Dockside monitoring
DWF	Distant-Water Fleets
E.O.	Executive Order
EA	Environmental Assessment
ECPA	East Coast Pelagic Association
ECTA	East Coast Tuna Association
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement

ESA	Endangered Species Act
ETA	Elephant Trunk Area
F	Fishing mortality rate
FAAS	Flexible Area Action System
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FSCS	Fisheries Scientific Computer System
FSEIS	Final Supplemental Environmental Impact Statement
FW	Framework
FY	Fishing year
GAMS	General Algebraic Modeling System
GB	Georges Bank
GEA	Gear Effects Evaluation
GIFA	Governing International Fisheries Agreement
GIS	Geographic Information System
GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
GRT	Gross registered tons/tonnage
HAPC	Habitat area of particular concern
HCA	Habitat Closed Area
HPTRP	Harbor Porpoise Take Reduction Plan
I/O	Input/output
ICNAF	International Commission for the Northwest Atlantic Fisheries
IFQ	Individual fishing quota
IOY	Initial Optimal Yield
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual transferable quota
IVR	Interactive voice response reporting system
IWC	International Whaling Commission
IWP	Internal Waters Processing
JVP	Joint Venture Processing
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
NERO	Northeast Regional Office
NLCA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NSGs	National Standard Guidelines
NSTC	Northern Shrimp Technical Committee
NT	Net tonnage
NWA	Northwest Atlantic
OBDBS	Observer database system
OA2	Omnibu 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
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	Weighout
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. Several lawsuits are challenging various provisions of Amendment 16, including the amendment's provisions related to sectors and some of the accountability measures.

Four framework adjustments have updated the measures in Amendment 16. The first, published as Framework 44, became effective on May 1, 2010 concurrently with Amendment 16. It adopted the required specifications for regulated northeast multispecies stocks for fishing years 2010-2012, as well as stocks managed by the U.S./Canada Resource Sharing Agreement. It was also used to incorporate the best available information in adjusting effort control measures adopted in Amendment 16. Framework 45 became effective on May 1, 2011. It built upon revisions made to the sector program in Amendment 16 and Framework 44, set specifications required under the U.S./Canada Resource Sharing Agreement, and incorporated an updated stock assessment for pollock. Framework 46 was implemented in September 14, 2011 and modified the provisions that restrict mid-water trawl catches of haddock. Finally, Framework 47 was implemented on May 1, 2012 and updated the status determination criteria for winter flounder, Gulf of Maine cod, altered the rebuilding program for Georges ank yellowtail flounder, updated specifications and implemented management measures to prevent overfishing.

This framework is primarily intended to update Status Determination Criteria and Commercial and Recreational Fishery Measures including allowing sectors to request exemptions from the year round closed areas, Accountability Measures and minimum fish size revisions. It will also build upon revisions made to the fishery administration program in Amendment 16 and Frameworks 44 through 47.

3.2 Purpose and Need for the Action

This framework adds to elements of Amendment 16 to prevent overfishing and ensure continued collection of fisheries data. Similar modifications to Amendment 16 have been made in recent frameworks. This framework would also modify measures from Amendment 16 regarding industry funded at-sea monitoring, and would evaluate various measures that may minimize economic impacts on the fleet caused by reductions in short-term allocations. These measures are intended to be short-term and specific to the groundfish plan that includes modifications to the minimum fish size requirements and access to the year round closed areas.

These specifications and adjustments to Amendment 16, listed in the following table, 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, the following table summarizes the need for the action and corresponding purposes.

Need for Framework 48	***Corresponding Purpose for Framework 48***
Modify management measures in order to ensure that overfishing does not occur consistent with the status of stocks, the National Standard guidelines, and the requirements of the MSA of 2006	• Modification of restrictions on the catch of Georges Bank yellowtail flounder • Modification of accountability measures for certain stocks, including halibut • Modification of measures for the recreational fishery
• Modification of observer coverage levels to improve documentation and reduce costs Modify management measures regulating the at sea monitoring program to be in compliance with Amendment 16	• Modify management measures regulating the at sea monitoring program in compliance with Amendment 16 • Modification of expenses industry is required to cover • Modification of management measures for dockside monitoring
Modify management measures to mitigate negative economic impacts for the fleet from projected low allocations	• Allow sectors to request exemptions from year round closure system for groundfish vessels • Modification of management measures for minimum fish size requirements

3.3 Brief History of the Northeast Multispecies Management Plan

Groundfish stocks were managed under the M-S Act beginning with the adoption of a groundfish plan for cod, haddock, and yellowtail flounder in 1977. This plan relied on hard quotas (total allowable catches, or TACs), and proved unworkable. The quota system was rejected in 1982 with the adoption of the Interim Groundfish Plan, which relied on minimum fish sizes and codend mesh regulations for the Gulf of Maine and Georges Bank to control fishing mortality. The interim plan was replaced by the Northeast Multispecies FMP in 1986, which established biological targets in terms of maximum spawning potential and continued to rely on gear restrictions and minimum mesh size to control fishing mortality. Amendment 5 was a major revision to the FMP. Adopted in 1994, it implemented reductions in time fished (days-at-sea, or DAS) for some fleet sectors and adopted year-round closures to control mortality. A more detailed discussion of the history of the management plan up to 1994 can be found in Amendment 5 (NEFMC 1994). Amendment 7 (NEFMC 1996), adopted in 1996, expanded the DAS program and accelerated the reduction in DAS first adopted in Amendment 5. After the implementation of Amendment 7, there were a series of amendments and smaller changes (framework adjustments) that are detailed in Amendment 13 (NEFMC 2003). Amendment 13 was developed over a four-year period to meet the M-S Act requirement to adopt rebuilding programs for stocks that are overfished and to end overfishing. Amendment 13 also brought the FMP into compliance with other provisions of the M-S Act. Subsequent to the implementation of Amendment 13, FW 40A provided opportunities to target healthy stocks, FW 40B improved the effectiveness of the effort control program, and FW 41 expanded the vessels eligible to participate in a Special Access Program (SAP) that targets GB haddock. FW 42 included measures to implement the biennial adjustment to the FMP as well as a Georges Bank yellowtail rebuilding strategy, several changes to the Category B (regular) DAS Program and two Special Access Programs, an extension of the DAS leasing program, and introduced the differential DAS system. FW 43 adopted haddock catch caps for the herring fishery and was implemented August 15, 2006. Amendment 16 was adopted in 2009 and provided major changes in the realm of groundfish management. Notably, it greatly expanded the sector program and implemented Annual Catch Limits in compliance with 2006 revisions to the M-S Act. The amendment also included a host of mortality reduction measures for "common pool" (i.e. non-sector) vessels and the recreational component of the fishery. Framework 44 was also adopted in 2009, and it set specifications for FY 2010 – 2012 and incorporated the best available information in adjusting effort control measures adopted in Amendment 16. Framework 45 was approved by the Council in 2010 and adopts further modifications to the sector program and fishery specifications; it was implemented May 1, 2011. Framework 46 revised the allocation of haddock to be caught by the herring fishery and was implemented in August 2011. Amendment 17, which authorizes the function of NOAA-sponsored state-operated permit bank, was implemented on April 23, 2012. Framework 47, implemented on May 1, 2012, revised common pool management measures, modified the Ruhle trawl definition and clarified regulations for carter/party and recreational groundfish vessels fishing in groundfish closed areas. An appeal of the lawsuit filed by the Cities of Gloucester and New Bedford and several East Coast fishing industry members against Amendment 16 is being heard by the U.S. Court of Appeals for the First Circuit in Boston in September, 2012. A more detailed description of the history of the FMP is included in Amendment 16, and each of these actions can be found on the internet at http://www.nefmc.org.

3.4 National Environmental Policy Act (NEPA)

NEPA provides a structure for identifying and evaluating the full spectrum of environmental issues associated with Federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts.

4.0 Alternatives Under Consideration

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

4.1.1 Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake

4.1.1.1 Option 1: No Action

If no action is adopted, there will be no revisions to status determination criteria for the Georges Bank and Gulf of Maine cod stocks, the Southern New England/Mid-Atlantic yellowtail flounder stock, or white hake. Please note that this option could be selected for all of these stocks, or only some of these stocks. The following criteria would apply:

Table 1 – No Action status determination criteria

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Gulf of Maine Cod	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40%MSP
Georges Bank Cod	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40%MSP
SNE/MA Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40%MSP
White Hake	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40%MSP

Table 2 – No action numerical estimates of SDCs

Stock	Model	Bmsy or proxy (mt)	F_{MSY} or proxy	MSY (mt)
Gulf of Maine Cod	ASAP	61,218	0,20	10,392
Georges Bank Cod	VPA	148,084	0.25	31,159
SNE/MA Yellowtail Flounder	VPA	27,400	0.25	6,100
White Hake	SCAA	56,254	0.13	5,800

4.1.1.2 Option 2: Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake (*Preferred Alternative*)

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

The NEFSC conducted new assessment for the GOM cod, GB cod, and SNE/MA yellowtail flounder stock in 2012. An assessment for white hake will be conducted in 2013. This action adopts the revised status determination criteria for these stocks. The review panel recommended the criteria and numerical values in Table 3 and Table 4.

This option considers a range of values since the assessments will not be completed until after the Council vote on this action

Rationale: This option would update the status determination criteria for these stocks to reflect the best available scientific information. This will provide the most appropriate mortality and biomass targets as the basis for management.

Table 3 – Option 2

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Gulf of Maine Cod	$SSB_{MSY\text{ or a proxy for }SSBMSY}$	½ Btarget	F_{MSY} or a proxy for FMSY
Georges Bank Cod	$SSB_{MSY\text{ or a proxy for }SSBMSY}$	½ Btarget	F_{MSY} or a proxy for FMSY
SNE/MA Yellowtail Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40%MSP
White Hake	$SSB_{MSY\text{ or a proxy for }SSBMSY}$	½ Btarget	F_{MSY} or a proxy for FMSY

Table 4 – Option 2

Stock	Model	Bmsy or proxy (mt)	F_{MSY} or proxy	MSY (mt)
Gulf of Maine Cod	ASAP	TBD	TBD	TBD
Georges Bank Cod	VPA	TBD	TBD	TBD
SNE/MA Yellowtail Flounder	ASAP	2,995	0.316 (fully recruited ages 4-5)	773
White Hake	SCAA	TBD	TBD	TBD

4.1.2 SNE/MA Windowpane Flounder Sub-ACLs

More than one alternative to No Action/Option 1 can be adopted from this section.

4.1.2.1 Option 1: No Action

If this option is adopted, there will not be any additional sub-ACLs adopted for SNE/MA windowpane flounder. Only the multispecies fishery will have a sub-ACL for this stock and the AMs for the multispecies fishery must be sufficient to account for overages of the overall ACL.

Rationale: This option would not distribute the ACL for SNE/MA windowpane flounder to other fisheries. This would simplify accounting, but would mean that the groundfish fishery would be responsible for any overages of the ACL.

4.1.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL (*Preferred Alternative*)

If this option is adopted, a sub-ACL of SNE/MA windowpane flounder will be allocated to the scallop fishery. The sub-ACL will be based the 90th percentile of the scallop fishery catches (as a percent of the total) for the period calendar year 2001 through 2010. This change reduces the amount allowed for other sub-components.

The GARM III and 2012 Assessment Update for SNE/MA windowpane flounder only included catches from limited access scallop dredges and trawls. This value is 32 percent (rounded up from 31.9 pct of catches as shown in Table 5). Prior to 2004, there was limited observer coverage of General Category scallop dredge and trawl trips. From 2004 to 2011, the average General Category catch of this stock was 22 mt. In order to determine the scallop fishery sub-ACL, 22 mt was added to each year 2001-2010 and the scallop fishery share computed. The combined total is 36 percent. This percentage of the ABC wouold be used to determine the scallop fishery sub-ABC, and then this would be adjusted for management ucnertainty to get the scallop fishery sub-ACL.

Specific scallop fishery AMs for this sub-ACL would be adopted in a future scallop management action during 2013. The AMs will be implemented in time to be effective in 2014. If there is an overage in the scallop fishery sub-ACL that is allocated in 2013, any overage of the 2013 sub-ACL will be subject to the AMs that are adopted. Consistent with a policy adopted in FW 47 for the scallop fishery, any scallop fishery AMs for this sub-ACL will only be triggered if the overall ACL is exceeded and the scallop fishery sub-ACL is exceeded, or the scallop fishery catch is 150 percent or more of the sub-ACL.

The Scallop FMP will develop AMs for this sub-ACL.

Table 5 – Limited access scallop fishery discards of SNE/MAB windowpane flounder, 2001-2010. Landings were less than 1 metric ton in all years.

Calendar Year	Catch	Limited Access Scallop Dredge/Trawl Discards	Limited Access Scallop Fishery Catches as Percent of Total	General Category (Trawl/Dredge) Scallop Fishery Catch Assumption	Total Scallop Fishery Catch As Percent of Total
2001	184	7	3.8%	22	14.1%
2002	339	50	14.7%	22	19.9%
2003	522	73	14.0%	22	17.5%
2004	400	44	11.0%	22	15.6%
2005	330	103	31.2%	22	35.5%
2006	431	63	14.6%	22	18.8%
2007	349	41	11.7%	22	17.0%
2008	321	53	16.5%	22	21.9%
2009	463	55	11.9%	22	15.9%
2010	490	187	38.2%	22	40.8%
		Average, 2001-2010	16.8%		21.7%
		90th percentile, 2001-2010	31.9%		36.0%

Rationale: The scallop fishery catches of this stock are large enough that the effectiveness of the AM system could be undermined if those catches are not constrained and subject to an AM. This measure would create a sub-ACL, based on recent scallop fishery catches. Because of the lack of General Category observer coverage from 2001 to 2003, an assumption is used to estimate those catches based on catches since 2004. AMs for the scallop fishery will be adopted in a future action and will be applicable to any overage that occurs in 2013.

4.1.2.3 Option 3: Other Sub-Components Sub-ACL (*Preferred Alternative*)

The portion of this stock allocated to other sub-components in federal waters will be treated as a sub-ACL and will be renamed “other fisheries sub-ACL.”

Rationale: This is an administrative measure which makes it possible to adopt an AM that applies to catches by other fisheries. That AM is proposed in section 4.2.6.4.

4.1.3 Scallop Fishery Sub-ACL for Georges Bank Yellowtail Flounder

4.1.3.1 Option 1: No Action

If this option is adopted, there will not be any changes to how the scallop fishery sub-ACL for GB yellowtail flounder is determined. The amount will be determined when groundfish specifications are set and will consider such information as is available and appropriate.

Rationale: Allocations of GB yellowtail flounder to the scallop fishery would be made each time the scallop management program is established in a framework action. No specific policy would be adopted on the amount that is allocated to each fishery, which would allow the most flexibility in considering the management of each fishery when setting the allocations.

4.1.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Based on Estimated Catch

If this option is adopted, on an annual basis, the Scallop and Groundfish Plan Development Teams will estimate the amount of GB yellowtail flounder that the scallop fishery is expected to catch in the following year while harvesting the available scallop yield. The sub-ABC of GB yellowtail flounder would be 90 percent of this estimate, and the sub-ACL would be specified by adjusting this sub-ABC for management uncertainty. These values would be provided to the Council at the September Council meeting. The allocation of GB yellowtail flounder to the scallop fishery would be changed using procedures that are consistent with the APA without the need for a Council vote. Should the Council wish to revise this allocation, a change must be adopted through a specification change or other management action.

This option has been criticized based on the belief that it will continuously result in reduced allocations of GB yellowtail flounder to the scallop fishery. This argument focuses on the fact that the allocation is based on 90 percent of the expected catch in any given year. But the calculation is based on recent catch rates of yellowtail flounder by the scallop fishery, changes in yellowtail flounder stock size, changes in scallop stock size, and areas fished. If all four elements are unchanged, then the expected catch would also be unchanged and the allocation would not change as well (90 percent of the same value would be the same value as was allocated).

Rationale: This measure would adopt a standard approach for the amount of GB yellowtail flounder that is allocated to the scallop fishery. As new data is collected on bycatch rates and scallop and GB yellowtail flounder stock size, this measure would create a process to adjust the allocation so the best estimate is used without requiring a specific Council action.

4.1.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History (*Preferred Alternative)*

If this option is adopted, the scallop fishery sub-ACL for GB yellowtail flounder would be specified as a fixed percentage of the U.S. ABC. The Council would select a percentage for this action that would apply to all future allocations. This percentage would be applied to the U.S. ABC to get a sub-ABC, and this value would be adjusted for management uncertainty to get the scallop fishery sub-ACL. Recent catch history is shown in Table 6. The Council considered a percentage selected from a range of 8-16 percent and once defined by FW 48 this percentage would be used unless changed in a future action. This option would base the scallop fishery sub-ABC for FY 2013 as 40 percent of the U.S. ABC; subsequent years would base the scallop fishery sub-ABC as 16 percent of the U.S. ABC. These values would be adjusted to account for management uncertainty to determine the scallop fishery sub-ACL.

This measure would not modify the existing regulation that requires that NMFS estimate the expected scallop fishery catch of GB yellowtail flounder for the current fishing year by January 15. If NMFS determines that the scallop fishery catch will be less than 90 percent of its GB yellowtail flounder sub-ACL, the Regional Administrator may reduce the scallop fishery sub-ACL and increase the groundfish fishery sub-ACL by any amount reduced from the scallop fishery sub-ACL (50 CFR 648.90(a)(4)(iii)(C)).

This measure would also clarify that any AM that resultsfrom exceeding the U.S./Canada Resoruce Sharing Understanding GB yellowtail flounder TAC would lead to a an adjustment of the sub-ACL of the component of the fishery that caused the overage.

Rationale: This measure would adopt an allocation based on recent catch history. This simplifies determination of the GB yellowtail flounder allocation for this fishery. It also gives the scallop fishery a fixed percentage for an allocation. This will facilitate that fishery developing ways to avoid yellowtail flounder while maximizing its catch of scallops.

Table 6 – Scallop dredge discards of GB yellowtail flounder, 1997-2011. Based on TRAC 2012 assessment of GB yellowtail flounder.

Calendar Year	Landings (metric tons)	Discards (metric tons)	Catch (metric tons)	Scallop Discards (metric tons)	Scallop Landings (metric tons)	Scallop Discards As Pct of Catch
2002	2,476	53	2,529	29	0.2	1.2%
2003	3,236	410	3,646	293	0.1	8.0%
2004	5,837	460	6,297	81	3.0	1.3%
2005	3,161	414	3,575	186	8.1	5.4%
2006	1,196	384	1,580	251	2.6	16.1%
2007	1,058	493	1,551	120	1.5	7.8%
2008	937	409	1,346	128	0.3	9.5%
2009	959	759	1,718	170	1.9	10.0%
2010	654	289	943	8	0.2	0.9%
2011	904	192	1,096	104	8.6	10.3%
				Average, 2002 - 2011		7.1%
				Average, 2007-2011		7.7%

4.1.4 Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

4.1.4.1 Option 1: No Action

If this option is adopted, there would not be a specific sub-ACL for GB yellowtail flounder for small-mesh bottom trawl fisheries. Catches of this stock by vessels using this gear would be counted as part of the "other sub-components" category.

4.1.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder (*Preferred Alternative*)

If this option is adopted, there would be a specific sub-ACL for GB yellowtail flounder for small-mesh bottom trawl fisheries. Catches of this stock by vessels using this gear would be no longer counted as part of the "other sub-components" category. AMs would expected to be be developed by the relevant FMPs within one year of the implementation of this sub-ACL. The sub-ACL would be based on the median small-mesh fisheries catches of GB yellowtail flounder from 2004 through 2011, or two percent (these fisheries are not permitted to land yellowtail flounder, so the percentage is based on discard estimates shown below).

For the purposes of this sub-ACL, small-mesh bottom trawl fisheries are defined as those vessels that use a bottom otter trawl with a cod-end mesh size of less than 5 inches. Typical target species for vessels using this gear on GB are whiting and squid.

The sub-ACL would be based on a percentage of the U.S. ABC for this stock. This percentage would be applied to the ABC to get a sub-ABC, and then the sub-ABC would be adjusted to account for management uncertainty in order to get the sub-ACL. The percentage will be based on recent catch history, shown below in Table 7. Because of limited observer coverage prior to 2004, the period 2004-2011 will be used as the basis for the catch history.

Table 7 – Recent small-mesh fisheries catches of GB yellowtail flounder (TRAC 2012)

Year	U.S. Landings	U.S. Discards	U.S. Catch	Small-Mesh Discards	Small-Mesh Discards as Percent of U.S. Catch
2004	5837	460	6297	55	0.01
2005	3161	414	3575	52	0.01
2006	1196	384	1580	26	0.02
2007	1058	493	1551	110	0.07
2008	937	409	1346	26	0.02
2009	959	759	1718	24	0.01
2010	654	289	943	30	0.03
2011	904	192	1096	33	0.03
				mean	0.03
				median	0.02
				90th ptile	0.04

Rationale: While small-mesh fishery catches of GB yellowtail flounder have generally been less than 100 mt in recent years, with declining ABCs for this stock they are an increasing percentage of the total U.S. catch. Adoption of a sub-ACL will enable control of those catches through the use of an AM. AMs will be developed by the relevant FMP.

4.2 Commercial and Recreational Fishery Measures

4.2.1 Management Measures for the Recreational Fishery

This section considers changing recreational fishery management measures as necessary to control catches of GOM cod and GOM haddock.

4.2.1.1 Option 1: No Action

If this option is adopted, there would be no changes to the administration of the AMs for the recreational fishery. The AM would only be a reactive AM, with changes to measures only allowed after a sub-ACL has been exceeded.

Under this option, if it is determined that the recreational fishery exceeded its sub-ACL for a stock, NMFS consults with the Council and then implements appropriate measures to prevent the sub-ACL from being exceeded.

Rationale: The need to change recreational measures can only be verified after catches are known and are compared to the ACLs. This option would continue the current practice of making measures more restrictive only if the recreational sub-ACL is exceeded.

4.2.1.2 Option 2: Revised Accountability Measure for the Recreational Fishery (*Preferred Alternative*)

If this option is adopted, the AM for the recreational fishery would be modified pursuant to the Council's authority to amend AMs through framework actions. The existing AM only allows changes to recreational measures if an ACL is exceeded, and is solely a reactive AM. This measure would modify the AM so that proactive changes to measures can be implemented if necessary. Rather than wait until the recreational fishery exceeds a sub-ACL, the Regional Administrator would be allowed to adjust recreational measures so that the recreational fishery will achieve, but will not exceed, the specific sub-ACLs that are allocated to the fishery. To the extent possible, changes to recreational measures that result from anticipated changes in sub-ACLs will be made before the start of the fishing year. Any changes will be adopted through procedures consistent with the APA.

Prior to changing recreational measures, the NMFS would consult with the Council and would advise the Council what measures are under consideration. Time permitting, the Council would provide the recreational Advisory Panel an opportunity to discuss the proposals in a public meeting. Should the Council provide recommended measures to the NMFS, the agency would explain any deviations from those recommendations when measures are adopted.

When selecting measures, NMFS would consider the following guidance:

- If additional effort controls are necessary to reduce cod catches, consideration should be given, in order, to increase minimum size limits, adjust seasons and change bag limits.

- If additional effort controls are necessary to reduce haddock catches, consideration should be given, in order, to increase minimum size limits and change bag limits, and adjust seasons.

If this measure is adopted, any adjustments to recreational measures that are necessary for FY 2013 would be announced as soon as possible (should this measure be approved) and the management measures would be implemented on or about the start of the FY. Development of recreational measures for FY 2013 – including the consultations with the Council and Recreational Advisory Panel – would occur prior to approval and implementation of FW 48. The requirement for NMFS to consider the Council's recommendations for FY 2013 recreational measures would be contingent on approval of this measure.

Rationale: Under the current AMs, there is no mechanism to adjust recreational measures if the expectation is that the recreational fishery will exceed or not achieve a future ACL. This increases the risk that overfishing will occur (if catches are expected to exceed the ACL), and reduces the ability to achieve OY for this fishery (if catches are expected to be less than the ACL). This measure proposes to revise the AM so that it can be used in a reactive manner. The required consultations with the Council are intended to provide increased opportunity for public comment, and to provide more opportunity for states to coordinate their measures with NMFS. The guidance on measures that NMFS should consider, and the priority order, is not intended to restrict the Agency's discretion in choosing measures. In FY 2013, the timing of the implementation of this action means that any changes to measures may not be formally announced until the start of the fishing year.

4.2.2 Groundfish Monitoring Program Revisions

4.2.2.1 Option 1: No Action

If this option is adopted, groundfish monitoring requirements would remain as defined in Amendment 16 and subsequent framework actions. These requirements establish the goals and standards for monitoring both common pool and groundfish catches, as well as responsibility for funding those requirements. There are a number of elements of that program that are germane to the options that are being considered.

The goals of the sector monitoring program were updated in Amendment 16 (NEFMC 2009). That document did not include an explicit listing of sector monitoring program goals and objectives, but various sections did identify reasons for sector monitoring programs. These include:

- Sector operations plans will specify how a sector will monitor its catch to assure that sector catch does not exceed the sector allocation.
- A dockside monitoring program will also be implemented in order to verify landings of a vessel at the time it is weighed by a dealer, to certify the landing weights are accurate as reported on the dealer report.
- The primary goal of observers or at-sea monitors for sector monitoring is to verify area fished, catch, and discards by species, by gear type.
- 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.

Amendment 16 also specified a coverage level standard for sectors. This requirement focused on the coefficient of variation (CV) of discard estimates but also noted that other factors could be considered when determining coverage levels:

> "For observer or at-sea monitor coverage, minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology. The required levels of coverage will be set by NMFS based on information provided by the Northeast Fisheries Science Center (NEFSC) and may consider factors other than the SBRM CV standard when determining appropriate levels. Any electronic monitoring equipment or systems used to provide at-sea monitoring will be subject to the approval of NMFS through review and approval of the sector operations plan. Less than 100% electronic monitoring and at-sea observation will be required."

Beginning in 2013, Amendment 16 and this option would require that the at-sea monitoring program would be industry funded. This option would also adopt the dockside monitoring requirements adopted in Amendment 16, as modified by Framework (FW) 45. Sectors are required to develop and implement an independent third-party weighmaster/dockside monitoring system that is satisfactory to NMFS for monitoring landings and utilization of ACE. The details of the weighmaster/dockside monitoring system must be provided in the sector's operations plan. In FY 2013, 20 percent of trips would be subject to this dockside monitoring requirement.

4.2.2.2 Option 2: Monitoring Program Goals and Objectives (*Preferred Alternative*)

The goals of the groundfish monitoring program 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 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 for effectiveness

Rationale: This option would expand on the goals and objectives for the monitoring program. More specific goals and objectives will help in the design and evaluation of monitoring programs. The goals and objectives would apply to all elements of the monitoring program and all of the monitoring measures would be interpreted and applied consistent with the overarching tenets of the program established by this measure.

4.2.2.3 Option 3: ASM Coverage Levels

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

4.2.2.3.1 Sub-Option A: Clarification of CV Standard (*Preferred Alternative*)

For observer or at-sea monitor coverage, minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology. The CV standard must be met at the level specified below:

Sub-Option A1 (*Prefererd Alternative*): For allocated groundfish stocks caught by sectors, the CV standard must be met for each stock at the overall stock level.

Sub-Option A2: For allocated groundfish stocks caught by sectors, the CV standard must be met for each stock and each sector.

The minimum coverage level based on CV is only appropriate for sector monitoring purposes if there is no evidence that behavior on observed and unobserved trips is different. If there is evidence that behavior is different, then a higher coverage level may be required to ensure the accuracy of discard estimates. The required levels of coverage will be set by NMFS based on information provided by the Northeast Fisheries Science Center (NEFSC) and may consider factors other than the SBRM CV standard when determining appropriate levels. Any electronic monitoring equipment or systems used to provide at-sea monitoring will be subject to the approval of NMFS through review and approval of the sector operations plan. Less than 100% electronic monitoring and at-sea observation will be required.

Rationale: While Amendment 16 specified that, at a minimum, ASM coverage must be sufficient to meet the CV standard specified by the SBRM, it was not clear what level of stratification should be used for the standard. This measure would clarify that issue. Sub-Option A1 would require that the standard be met at the overall stock level (i.e. GOM cod caught be all sectors), Sub-Option B would require that the standard be met at each stock and each sector level (i.e. GOM cod caught by each specific sector). Sub-Option A2 would lead to higher coverage levels than Sub-Option A. Neither option would require that the CV standard be met for each stratum within a sector. All of the options – including requirements levels of adequate coverage - would be interpreted and applied consistent with the overarching goals and objectives of the sector monitoring program.

4.2.2.3.2 Sub-Option B: Removal of Requirement for Industry-Funded At-Sea Monitoring for FY 2013 (*Preferred Alternative*)

This option would maintain at-sea monitoring coverage of sector trips at the level that NMFS can fund during FY 2013. Under this option, sectors would not be required to implement an industry-funded at-sea monitoring program in FY 2013. Instead, NMFS will provide as much funding as possible for at-sea monitoring of sector trips in FY 2013. Absent further action, industry will be responsible for the portion of these costs not funded by NMFS in FY 2014.

Rationale: Amendment 16 mandated that the industry will fund at-sea and dockside monitoring costs beginning in FY 2012. To date, NMFS has had sufficient funding to provide an at-sea monitoring program to fulfill this requirement for sectors annually since FY 2010. Absent continued funding for the NMFS at-sea monitoring program in FY 2013, sectors would be responsible for implementing industry-funded at-sea monitoring programs to monitor their fishing activities beginning May 1, 2013. The Council is concerned that imposing these costs on the industry in FY 2013 will reduce profitability and result in making the sector system an economic failure. This action delays by one year industry responsibility for those costs. A sunset date has been included so that the Council may further modify this requirement in the future as more information becomes available on the appropriate monitoring levels, costs of those programs, and implementation of electronic monitoring systems.

4.2.2.3.3 Sub-Option C: Lower coverage rates for sector trips on a Monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear (*Preferred Alternative*)

Under this option, upon an annual determination by NMFS of sector ASM coverage rates, NMFS would specify some lower coverage rate for sector trips under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear. The monkfish regulations currently require any vessel fishing on a monkfish DAS using gillnet gear to use a minimum of 10” mesh gillnets.

PTNS would have to be revised to allow a vessel to indicate a trip under a monkfish DAS (this is currently not a field in the form). PTNS trip selection would also have to be revised to add a tier in which the determination is made based upon a vessel's PTNS declaration that the vessel will be taking an ELM gillnet trip on a monkfish DAS in the SNE Broad Stock Area and would be pulled aside for a different selection probability than all other sector trips. Sector vessels using this measure would still be required to land all groundfish of legal size on all sector trips. A vessel declaring a trip on a monkfish DAS through PTNS would be prohibited from changing its declaration for that trip. To facilitate the use of fishery-dependent data from these trips in stock assessments, NMFS would develop a method for identifying these trips in all appropriate fishery-dependent datasets.

Sub-Option C(1) (*Preferred Alternative*): NMFS determines some coverage rate for these trips annually. The coverage rates of all other sector trips must still at a minimum meet the performance standard required of sector monitoring adopted by FW 48 (see Section 4.2.2.3).

Sub-Option C(2): Trips in this pool are subject to NEFOP coverage only, no additional ASM coverage is required. The performance standard adopted by FW 48 for sector monitoring must still be met at a minimum (see Section 4.2.2.3) .

Rationale: There is a limited amount of money available to pay for ASM. This measure wouild reduce the use of ASM funds on trips that catch little groundfish, thereby helping to focus ASM resources on those trips that catch groundfish.

4.2.2.4 Option 4: Industry At - Sea Monitoring Cost Responsibility (*Preferred Alternative*)

If adopted, this option would make the following distinctions between those aspects of the groundfish monitoring program which the fishing industry could be required to support (partially or entirely) and those programmatic costs that will continue to be funded (permanently and entirely) by the National Marine Fisheries Service. Specifically, the industry shall only ever be responsible for contributing to the funding for direct at-sea monitor (ASM) costs: specifically the daily salary of the at-sea monitor.

Costs of the ASM and monitoring program shall continue to be supported entirely by NMFS. These program elements and activities would include, but are not exclusive to:

- Briefing, debriefing, training and certification costs (salary and non-salary)
- Sampling design development
- Data storage, management and security
- Data quality assurance and control
- Administrative costs
- Maintenance of monitoring equipment
- ASM recruitment, benefits, insurance and taxes
- Logistical costs associated with ASM deployment
- ASM travel and lodging

Rationale: This option clarifies the ASM expenses that would be the responsibility of industry and those that would be the responsibility of the government. The industry would be responsible for funding only the direct costs associated with the observer's presence on the vessel. Other costs are related to the programmatic costs of ASM and will remain the responsibility of the government. This measure will help make enforcement costs borne by the industry more manageable.

4.2.2.5 Dockside Monitoring Requirements

4.2.2.5.1 Option 1: No Action

If this option is adopted, dockside monitoring in FY 2013 would return to the levels specified in Amendment 16, as modified by Framework 45. At least 20 percent of trips in each sector and 20 percent of common pool trips would be monitored by dockside monitors. Coverage would focus on trips that do not have an observer or at-sea monitor.

Rationale: Dockside monitors verify that landings of groundfish are recorded and reported accurately. The coverage level is designed to reduce costs while providing information needed to have confidence that catches are being reported accurately. By focusing on trips that do not have an observer or at-sea monitor, more benefits are received from the funds available since there is no duplicate coverage of trips.

4.2.2.5.2 Option 2: Elimination of Dockside Monitoring Requirement (*Preferred Alternative*)

If adopted, this option would eliminate all dockside monitoring requirements beginning in FY 2013. There would not be any dockside monitoring requirements in the groundfish fishery unless adopted in a future action.

Rationale: Dockside monitoring increases the operating costs of sectors. Landings information is already provided through the dealer reporting system. As long as unreported landings do not occur, the dealer reports can be used to monitor sector landings and there is little advantage to having dockside monitors verify these reports. By eliminating the program, sector operating costs are reduced and redundant accounting is avoided.

4.2.3 Commercial Fishery Minimum Size Restrictions

4.2.3.1 Option 1: No Action

If no action is adopted, there will be no revision to the regulations regarding landings of the allocated regulated groundfish currently managed. The following minimum fish size regulations would apply unless changed in this or a future action.

Table 8 – No Action Minimum Fish Sizes (TL) for Commercial Vessels

Species	Size (inches)
Cod	22 (55.9 cm)
Haddock	18 (45.7 cm)
Pollock	19 (48.3 cm)
Witch Flounder (gray sole)	14 (35.6 cm)
Yellowtail Flounder	13 (33.0 cm)
American Plaice (dab)	14 (35.6 cm)
Atlantic Halibut	41 (104.1 cm)
Winter Flounder (blackback)	12 (30.5 cm)
Redfish	9 (22.9 cm)

Rationale: Since implementation in 1986, the Northeast Multispecies FMP has used minimum size limits in conjunction with gear requirements to reduce catches of sub-adult fish. When adopted the purpose of this measure was to provide opportunities for fish to spawn before harvest, as well as to reduce the incentive to use illegal mesh to increase catches.

4.2.3.2 Option 2: Changes to Minimum Size Limits (*Preferred Alternative*)

If this option is adopted minimum size limits for many groundfish species would be modified as shown below. Vessels fishing within sectors would be required to land all allocated groundfish that meets the minimum size requirements. Common pool vessels would also be subject to these minimum sizes, but because trip limits may apply to common pool vessels they are not required to land all legal-sized fish.

It should be noted that these changes would be made to reduce regulatory discards and to allow many fish to reach spawning age before being caught, not to facilitate targeting of smaller fish. As a result, while sectors would not be prohibited from requesting exemptions from minimum mesh requirements, the expectation is that before such a request would be approved a sector would have to explain how an exemption to mesh regulations would be unlikely to lead to increased targeting of juvenile groundfish. For example, an exemption request to allow use of square mesh less than 6.5 inches to target GB haddock, or smaller mesh to target redfish, might be approved under certain circumstances because these meshes might not increase catches of small fish. But a request to use a smaller diamond mesh to target haddock might not be approved because, depending on mesh size, it might be expected to increase catches of sub-legal fish.

Table 9 – Option 2 Minimum Fish Sizes (TL) for Commercial Vessels

Species	Minimum Size
Cod	19 in. (48.3 cm)
Haddock	16 in (40.6 cm)
Pollock	19 in. (48.3 cm)
Witch Flounder (gray sole)	13 in. (33 cm)
Yellowtail Flounder	12 in (30.5 cm)
American Plaice (dab)	12 in. (30.5 cm)
Atlantic Halibut	41 in. (104.1 cm)
Winter Flounder (blackback)	12 in. (30.5 cm)
Redfish	7 in. (17.8 cm)

Rationale: The minimum size limits proposed in this option are based on an analysis of the size of discarded fish in trawl gear in recent years and the length at 50 percent maturity. The minimum sizes shown would be expected to reduce many discards due to minimum size restrictions under the gear requirements in place in 2009-2011. It should be noted that these changes are being made to reduce regulatory discards, not to facilitate targeting of smaller fish.

4.2.3.3 Option 3: Full Retention

If this action is adopted all allocated, currently regulated groundfish of all sizes, including cod, haddock, white hake, pollock, Acadian redfish, yellowtail flounder, Georges Bank and Gulf of Maine winter flounder, witch flounder, and American plaice, must be retained by sector vessels, i.e. no discarding of non-prohibited fish. Discarding of non-allocated groundfish species, including those that require no-retention as part of a rebuilding program would continue. Allocated regulated groundfish that are physically damaged, e.g. by predation, must be retained. This action would not alter regulated mesh areas or restrictions on gear and methods of fishing. This measure would not change possession requirements for other species that are regulated by other Fishery Management Plans.

It should be noted that this change would be made to reduce regulatory discards, not to facilitate targeting of smaller fish. As a result, while sectors would not be prohibited from requesting exemptions from minimum mesh requirements, the expectation is that before such a request would be approved a sector would have to explain why such an exemption would not lead to increased targeting of juvenile groundfish. For example, an exemption request to allow use of square mesh less than 6.5 inches to target GB haddock, or smaller mesh to target redfish, might be approved under certain circumstances because these meshes might not increase catches of small fish. But a request to use a smaller diamond mesh to target haddock might not be approved because, depending on mesh size, it might be expected to increase catches of sub-legal fish.

Rationale: Full retention may help reduce monitoring costs by facilitating the adoption of electronic monitoring, as there would be less of a need to estimate the weight of groundfish discards. The amount of data collected by at-sea monitors required for total discard estimation and composition would also be reduced. Discarding is considered to be a wasteful practice. A portion of discarded fish is thrown back dead resulting in economic loss to fishermen and the needless loss of fish to the population.

4.2.4 GB Yellowtail Flounder Management Measures

Any of these options could be adopted. Options 2, and 3 could both be adopted at the same time, since Option 2 is only for FY 2013 and Option 3 does not have a time limit. If Option 3 is adopted by itself there would be no changes to the GB yellowtail flounder possession limits.

4.2.4.1 Option 1: No Action

If this option would be adopted, there would be no changes to the management measures for GB yellowtail flounder. There are two key provisions of those regulations that are pertinent to the options that are being considered.

When estimating discards of GB yellowtail flounder for the purposes of groundfish quota monitoring, if this option is adopted there would be one area used as the basis for discard monitoring. This area would match the existing stock boundaries for the stock. Furhter stratification would only be for sector, gear, and mesh.

The second provision that is germane is that there would be no gear requirements imposed on small-mesh bottom trawls fishing in the GB yellowtail flounder stock area that would be required to reduce catches of GB yellowtail flounder. Vessels participating in small-mesh bottom trawl fisheries would be subject to existing regulatory requirements. The two fisheries most affected by this measure would be for squid and whiting.

Rationale: This No Action option would not make any changes to existing measures that address GB yellowtail flounder. The area stratification scheme used for monitoring discards would be consistent with that used in the assessment of this stock. Small-mesh bottom trawl fisheries would be subject only to gear requirments adopted by the relevant management plans for those fisheries.

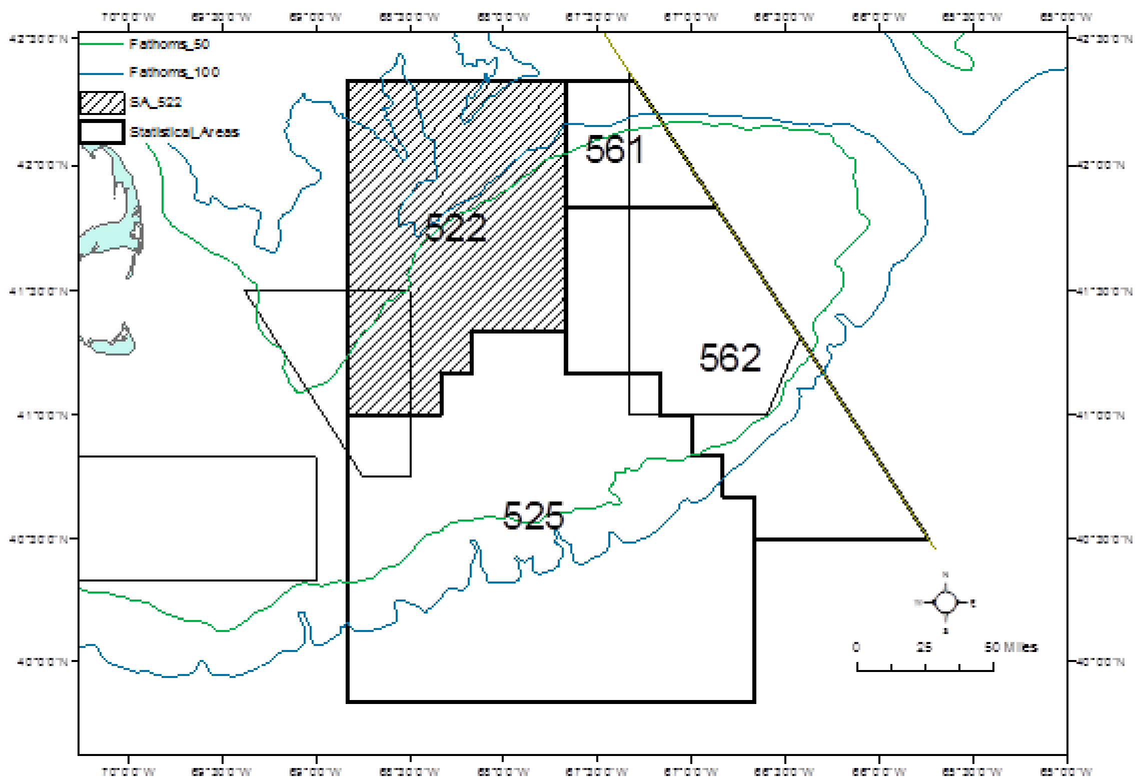
4.2.4.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder (*Prefered Alternative*)

This option would modify the stratification used for estimating discards of GB yellowtail flounder for in-season quota monitoring of sector catches. It would not change the stratification used in assessments, nor would it changethe stratification used to monitor common pool fishing tirps. If adopted, yellowtail flounder discards on groundfish trips would be calculated for two different areas: statistical area 522 and all other GB yellowtail flounder statistical areas. The areas are shown in Figure 1.

This approach would be used for all groundfish gear. It would not change the stratification method for other groundfish stocks. Yellowtail flounder is primarily caught by trawl gear. If the Regional Administrator determines that this additional stratification is not needed for other, non-trawl gears, then the stratification method can be modified to exclude those gears using procedures consistent with the APA.

Rationale: Yellowtail flounder are primarily caught in the shallower waters of GB. SA 522 includes a large area of deeper water where groundfish vessels target haddock and other species. Catch rates of yellowtail flounder are lower in this area than in the other statistical areas. By treating this as a different discard stratum for yellowtail flounder, the discard rate of GB yellowtail flounder that is applied to unobserved trips will more accurately reflect what occurs in this area, and will not be influenced by fishing activity in the other areas. This should allow more fishing in this area without exceeding allocations of GB yellowtail flounder. This is primarily an issue for trawl vessels, and the Regional Administrator can choose not to apply this approach to other gears if deemed unnecessary. This stratification scheme would not be adopted for common pool fishing trips because the small number of these trips would lead to inadequate trips to estimate an in-season discard rate.

Figure 1 – Proposed Change in Discard Strata for GB Yellowtail Flounder



4.2.4.3 Option 3: Small-Mesh Fishery Bottom Trawl Gear Requirements

This option would adopt gear requirements for bottom trawl vessels that are on non-groundfish trips (i.e., not fishing on a groundfish DAS and/or not fishing on a sector trip). Any vessel using a bottom trawl with a cod-end mesh size of less than five inches in statistical areas 522, 525, 561, or 562 would be required to use a trawl designed to minimize catches of flounders (see Figure 1). Approved trawls include the raised footrope trawl, separator trawl, Ruhle trawl, and rope trawl. Additional gear could be added to this list by the Regional Administrator using the process outlined in 50 CFR 648.85(n)(6)(iv)(J). For the purpose of this measure, the gear must reduce catches of yellowtail flounder consistent with the regulatory standards in order to be approved.

Rationale: Small-mesh bottom trawl vessels fishing on GB catch and discard GB yellowtail flounder and other flatfish. This measure would reduce the catches of these species, helping to address the bycatch reduction requirements of the M-S Act. It would also make more fish available for other fisheries that land these species.

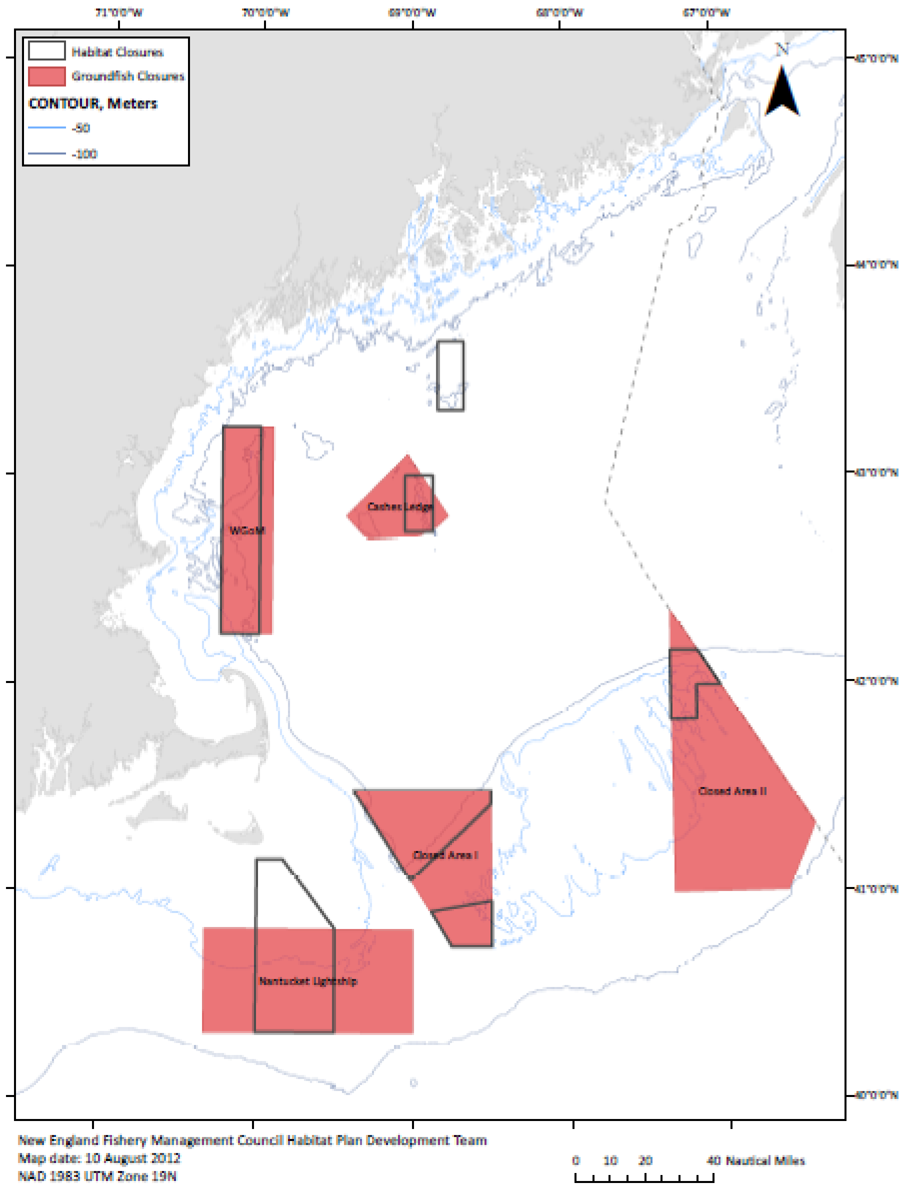
4.2.5 Sector Management Provisions – Allowed Exemption Requests

In previous actions, restrictions on sector exemptions were described in a section titled “Interaction with Common Pool Vessels.” This revised description is adopted for increased clarity.

4.2.5.1 Option 1: No Action

If adopted, there would be no changes to the restrictions on the types of exemptions that sectors can request. Specifically, sectors would not be permitted to request an exemption from year round closed areas. The current year round closed areas are shown in Figure 2.

Figure 2 – No Action groundfish and habitat closed areas



Rationale: While adopted primarily to assist in the control of groundfish fishing mortality, closed areas address a number of management issues. This measure would continue to limit access to closed areas with only a few exceptions that are adopted as special access programs.

4.2.5.2 Option 2: Exemption from Year-Round Mortality Closures (*Preferred Alternative*)

If adopted, this measure would modify sector management provisions. Specifically, sectors would be allowed to request an exemption from the prohibition on fishing in year round closed areas consistent with the following limitations:

Access will only be granted for the parts of areas that are not defined as habitat closed areas, or that have not been identified as potential habitat management areas as part of the development of the Omnibus Habitat Amendment. See Figure 3 for the areas that would be available for a sector exemption if this measure is implemented.

Access to Closed Area I and Closed Area II would only be granted for the period May 1 through February 15; access to the WGOM Closed Area would not be allowed when the area eligible for access is subject to rolling closures that are applicable to sectors. Only one such closure currently overlaps the part of the area in Figure 3 that is eligible for access by sector vessels; the overlap is shown in Figure 4.

Closed Area I Exemption Area

41° 4.3’N 69° 4.3’W
41° 26.0’N 68° 26.0’W
40° 58.0’N 68° 58.0’W
40° 54.95’N 68° 54.95’W

Closed Area II Exemption Area

41° 0.0’N 67° 0.0’W
41° 50.0’N 67° 50.0’W
41° 50.0’N 67° 50.0’W
42° 0.0’N 67° 0.0’W
42° 0.0’N 67° 0.0’W
41° 19.2’N 66° 19.2’W
41° 0.0’N 66° 0.0’W
42° 10.0’N 67° 10.0’W
42° 22.0’N 67° 22.0’W
42° 10.0’N 67° 10.0’W

Western Gulf of Maine Exemption Area

42° 15.0’N 69° 15.0’W
42° 15.0’N 70° 15.0’W
43° 15.0’N 70° 15.0’W
43° 15.0’N 69° 15.0’W

Nantucket Lightship Exemption Area

40° 20.0’N 68° 20.0’W
40° 20.0’N 69° 20.0’W
40° 50.0’N 69° 50.0’W
40° 50.0’N 68° 50.0’W
40° 20.0’N 70° 20.0’W
40° 50.0’N 70° 50.0’W
40° 50.0’N 70° 50.0’W
40° 20.0’N 70° 20.0’W

Closed Area II Exemption Area

42° 45.94’N 68° 45.94’W
42° 56.08’N 68° 56.08’W
42° 49.5’N 68° 49.5’W
42° 46.5’N 68° 46.5’W
42° 45.0’N 69° 45.0’W
42° 45.0’N 68° 45.0’W
42° 43.50’N 68° 43.5’W
42° 42.6’N 69° 42.6’W
42° 49.5’N 69° 49.5’W
43° 7.0’N 69° 7.0’W
43° 1.0’N 68° 1.0’W
43° 1.0’N 69° 1.0’W
42° 44.0’N 69° 44.0’W
42° 50.0’N 69° 50.0’W
42° 50.0’N 69° 50.0’W
42° 44.0’N 69° 44.0’W

An area on Fipennies Ledge has been identified as a potential habitat management area, and access would not be authorized for this area until the Omnibus Habitat amendment is completed. Any access restrictions would be specified in that action. The coordinates for this area are:

Fippennies Ledge Habitat Management Area (under consideration)

Point	Latitude	Longitude
1	42° 50.0’	-69° 17.0’
2	42° 44.0’	-69° 14.0’
3	42° 44.0’	-69° 18.0’
4	42° 50.0’	-69° 21.0’

When considering sector requests for access to the closed area, NMFS should include, inter alia, consideration of the potential for gear conflicts, shifts in fishing effort out of the closed areas, and impacts on protected species and lobsters.

Rationale: This measure would allow sectors to obtain greater access to portions of the year-round closed areas. Access to habitat closed areas would not be allowed in order to minimize, to the extent practicable, the adverse effects of fishing on EFH. The increased access will facilitate access to groundfish stocks such as GB haddock, pollock ,and redfish, in order that more of the ACLs of those stocks can be harvested. It is also possible that other non-groundfish stocks may be caught on groundfish fishing trips into the areas. These catches will also help mitigate the expected low FY 2013 ACLs for several stocks.

It is possible that a future action may modify the year-round closed areas, and may identify different habitat management areas. If that is the case, that action will address, if necessary, any modifications to this measure.

Figure 3 – Mortality closure areas eligible for a sector exemption (cross-hatched areas)

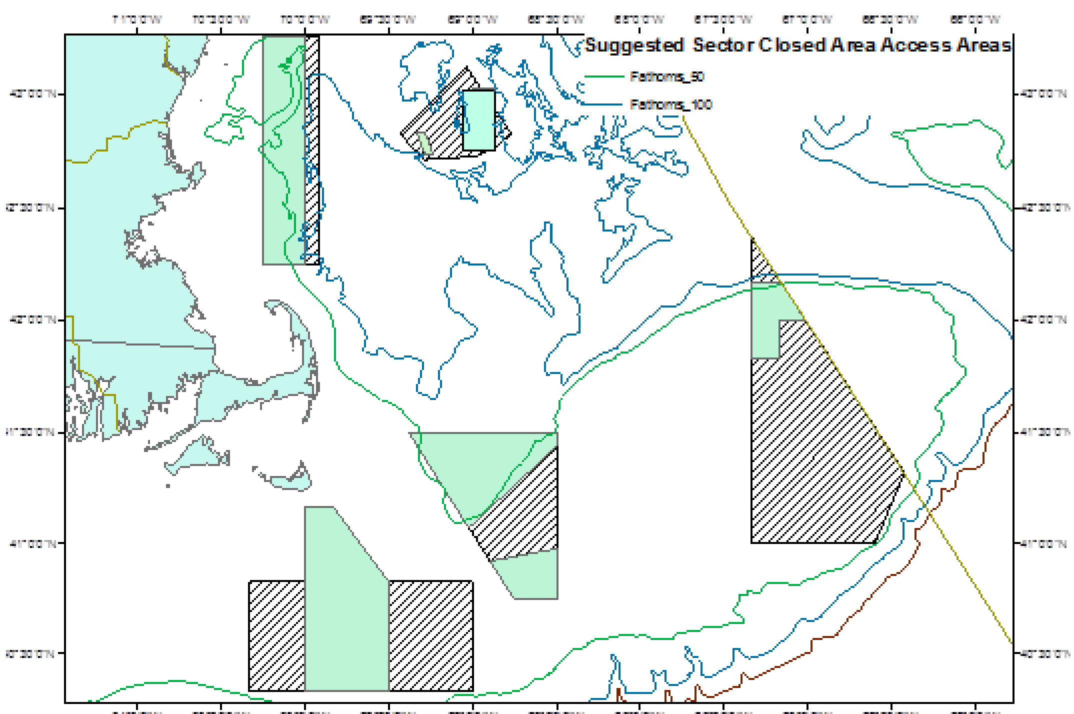
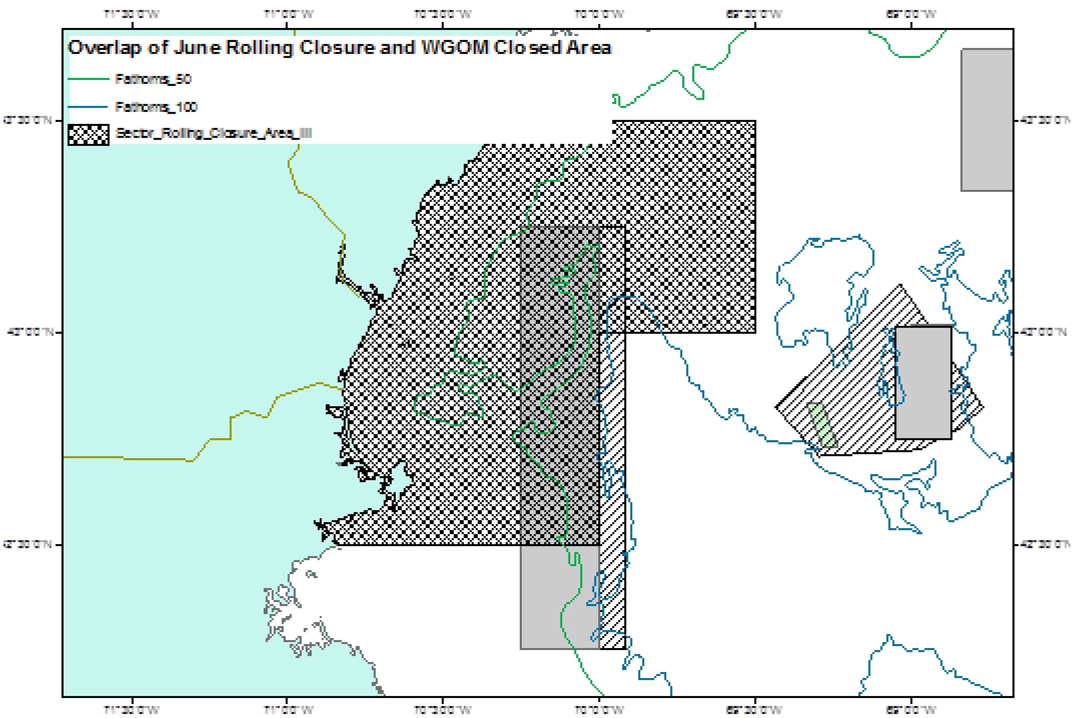


Figure 4 – Overlap of May sector rolling closure and WGOM closed area



4.2.6 Commercial Fishery Accountability Measures

More than one alternative to Option 1/No Action can be selected from this section.

4.2.6.1 Option 1: No Action

If this option is adopted, AMs for this fishery would remain as adopted by Amendment 16 and subsequent framework actions. The AM system that has been adopted is designed to reduce the probability of overfishing by adjusting management measures if a groundfish fishery ACL is exceeded. For sector vessels, the AM for most stocks is the requirement that sectors stop fishing in a stock area when an ACE is caught, and there is a pound-for-pound penalty in the following year if the ACE is exceeded. Common pool vessels are subject to a TAC system that closes specific areas if a quota is exceeded. There are exceptions to these general statements that are described below.

There are a number of elements of those measures that are pertinent to the options being considered in this action. For stocks that are not allocated to sectors (currently ocean pout, Atlantic halibut, windowpane flounders, Atlantic wolffish, and SNE/MA winter flounder), AMs are delayed until accurate information is available. For example, if there is an overage of an ACL in year 1, the AM is implemented in year 3. This would remain in effect if this option is adopted.

The AMs for Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder would not be changed if this option is adopted. The existing AMs prohibit possession of Atlantic halibut, Atlantic wolffish or SNE/MA winter flounder, if the respective ACL is exceeded. This measure would remain in place if this option is adopted.

The AM for SNE/MA windowpane flounder requires the use of selective trawl gear in specific areas if the ACL is exceeded. These requirements apply only to vessels on groundfish fishing trips. This measure would remain in place if this option is adopted.

Common pool vessels fishing with Handgear A (HA) or Handgear B (HB) permits are subject to the common pool accountability measures for specific stocks. These AMs consist of a trimester TAC system. Each stock-specific sub-ACL for the common pool is subdivided into three trimesters and if a trimester TAC is exceeded than a stock area closes. There are also provisions that adjust the trimester TACs if there is an overage or underage in a specific trimester. The stocks for which HA and HB vessels are subject to this AM system include GOM cod, GOM haddock, GB cod, GB haddock, white hake, and pollock. This measure would remain in place if this option is adopted.

4.2.6.2 Option 2: Change to AM Timing for Stocks Not Allocated To Sectors (*Preferred Alternative*)

If adopted, should reliable information be available that an ACL for a stock that has not been allocated to sectors has been exceeded during a fishing year, the respective AM for that stock would be implemented at the start of the next fishing year. The stocks that this measure would apply to as of 2012 are ocean pout, both windowpane flounder stocks, Atlantic wolffish, Atlantic halibut, and SNE/MA winter flounder; this list could change if the stocks that are allocated to sectors are changed. Subsequent to implementation of an AM, should updated catch information indicate that the ACL was not exceeded, the AM will be rescinded consistent with the APA.

AMs would not be implemented in the middle of a fishing year. If the information on an overage in fishing year 1 is not available until after the start fishing year 2, then the AM would be implemented at the start of fishing year 3.

If this action is implemented on or before May 1, 2013, and an ACL of a non-allocated stock is exceeded in FY 2012, then the AM will be implemented on May 1, 2013.

Rationale: This measure would modify the timing of AMs for non-allocated stocks so that when reliable information is available that indicates the ACL has been exceeded, the AMs can be implemented more quickly in order to reduce the risk of overfishing in consecutive years. At the same time, since fishing businesses need to plan their operations for each year, the measure makes it clear that the AMs will only be implemented at the start of a fishing year.

4.2.6.3 Option 3: Area – Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder (*Preferred Alternative*)

Atlantic Halibut

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

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

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

Areas: The areas would be implemented for ACL overages that exceed the management uncertainty buffer. The areas are designed to account for an ACL overage of up to 20 percent. Should an overage exceed 20 percent of the ACL, the AM will be implemented and then this measure will be reviewed in a future action.

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

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

Trawl Gear Halibut AM Area

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

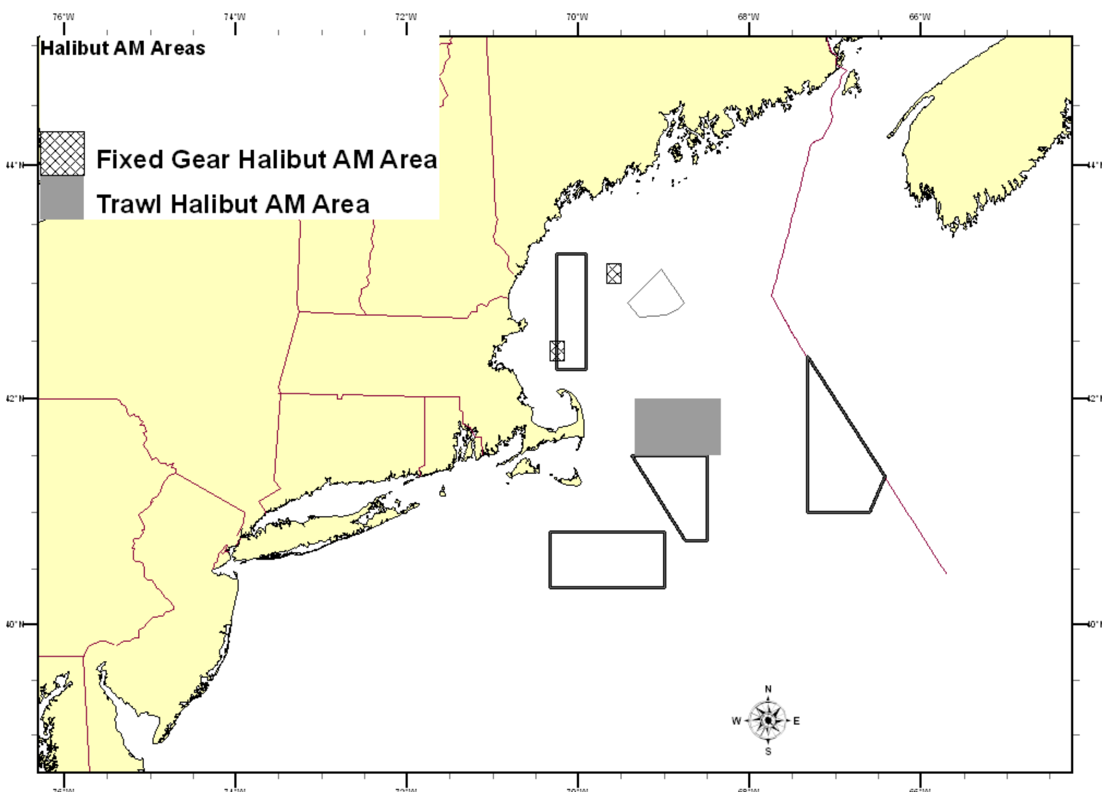
Fixed Gear Halibut AM areas

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

And

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

Figure 5 – Proposed AM areas for fixed gear and trawl vessels for halibut.



Atlantic Wolffish

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

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

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

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

Areas: The areas are designed to account for an AM overage of up to 20 percent. The areas would be implemented for ACL overages that exceed the management uncertainty buffer. Should an overage exceed 20 percent of the ACL, the AM will be implemented and then this measure will be reviewed in a future action.

The applicable areas where trawl gear restrictions would apply are shown in Figure 6.

The areas where sink gillnet and longline fishing would be prohibited (or if selective gear is developed, where use of the gear would be required) are shown in Figure 6.

Trawl Wolffish AM Area

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

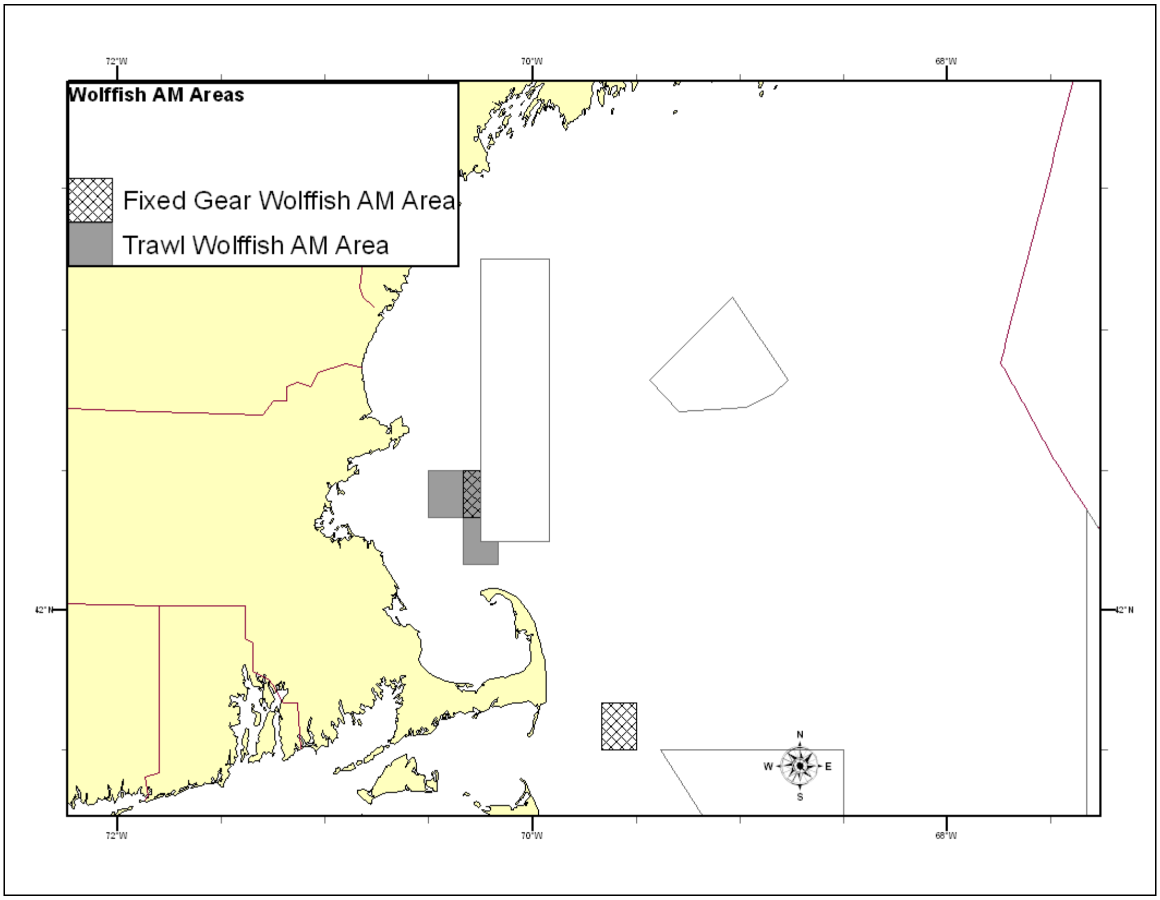
Fixed Gear Wolffish AM Area

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

And

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

Figure 6 – Proposed AM areas for fixed gear and trawl gear for wolffish. Note the AM areas overlap on the western side of the WWGOM closed area.



SNE/MA Winter Flounder

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

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

Areas: The applicable areas where gear restrictions would apply are shown in Figure 7. The areas are designed to account for an AM overage of up to 20 percent. The areas would be implemented for ACL overages that exceed the management uncertainty buffer. Should an overage exceed 20 percent of the ACL by more than the uncertainty buffer, the AM will be implemented and then this measure will be reviewed in a future action.

Coordinates for Figure 7

Block 1:

41-10N	071-40W

East to Block Island Coastline at 41-10N

East along Block Island Coastline to 41-10N

41-10N	071-20W
41-00NI	071-20W
41-00N	071-40W

Block 2:

41-20N	070-30W
41-20N	070-20W
41-00N	070-20W
41-00N	070-30W

Block 3

41-20N	069-20W
41-20N	069-10W
41-10N	069-10W
41-10N	069-20W

Block 4:

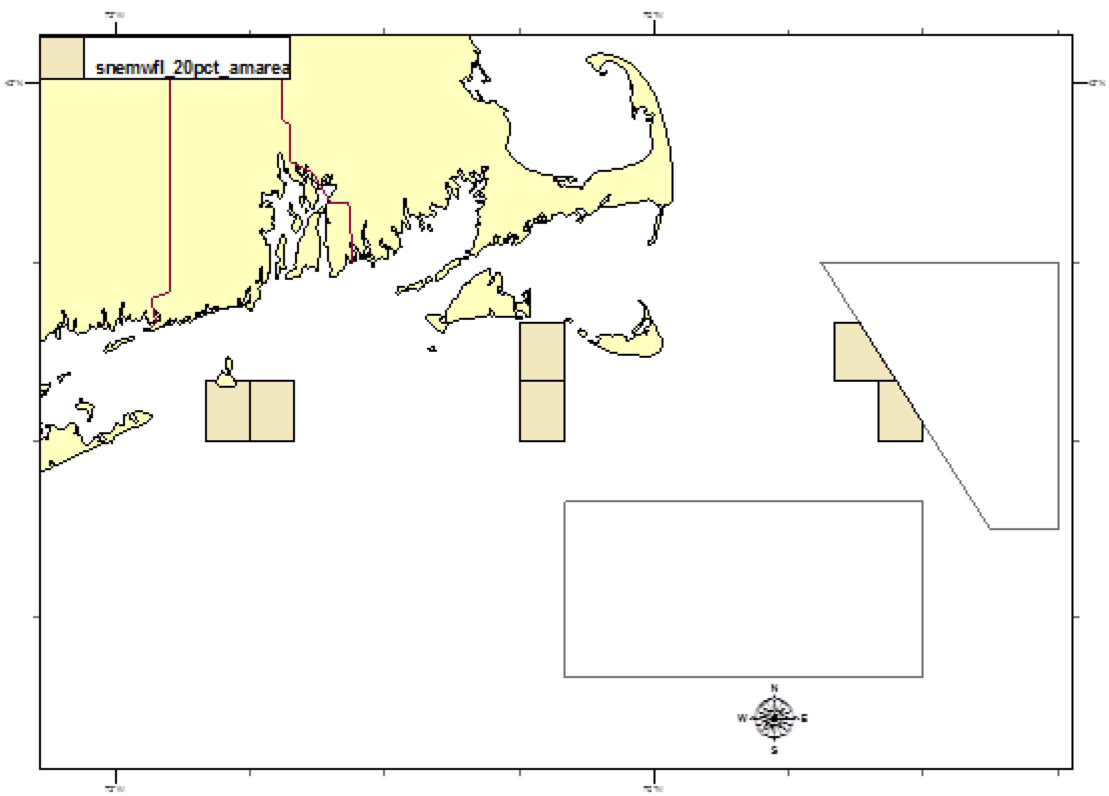
41-20N	069-20W

Closed Area I Boundary at 41-20N

Closed Area I Boundary at 069-00W

41-00N	069-00W
41-00N	069-10W
41-10N	069-10W
41-10N	069-20W

Figure 7 – Proposed SNE/MA winter flounder AM area



4.2.6.4 Option 4: Modifications to the Accountability Measures for SNE/MAB Windowpane Flounder *(Preferred Alternative)*

The existing AM for SNE/MAB would be modified to apply to two components of the SNE/MAB windowpane flounder ACL. The area-based AM would apply to both the groundfish sub-ACL and the other –sub-components portion of the ACL. If the groundfish portion of the sub-ACL is exceeded, and the overall ACL for this stock is exceeded by an amount that exceeds the management uncertainty buffer, then the AM would be applied to groundfish fishing vessels. If the overall ACL is exceeded by an amount that exceeds the management uncertainty buffer and the other sub-components portion of the ACL is exceeded, then the AM would apply to all trawl vessels using cod ends with a mesh size of 5 inches or larger (except the groundfish fishery unless that sub-ACL is also exceeded).

It is expected that this measure would only be adopted if the modification to the SNE/MAB ACL proposed in section 4.1.2.3 is adopted.

Rationale: Groundfish fishing vessels account for only a portion of the catch of SNE/MAB windowpane flounder. As a result, the current AM for this stock may not be adequate to prevent overfishing. Another large portion is harvested by trawl vessels in other fisheries that use mesh size larger than 5 inches. By extending this AM to apply to those stocks (in concert with defining the other sub-components portion as a sub-ACL), there is a greater likelihood that the AM will successfully control catches and help prevent overfishing.

4.2.6.5 Option 5 : Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

Amendment 16 specified that hook gear would be subject to trimester TAC provisions for cod, haddock, white hake, and pollock. If this measure is adopted, vessels fishing in the common pool with HA or HB permits and using either handgear or tub trawls would not be subject to the trimester TAC provisions for the following additional species:

White hake

The Regional Administrator is authorized to exempt HA and HB permits fishing in the common pool from the trimester TAC provisions if catches of a species or stock by these vessels are less than 1 percent of the common pool catch of that species or stock. This determination would be made prior to the start of the fishing year through procedures consistent with the APA. Any such determination would remain in effect until modified.

Rationale: The trimester TAC AMs adopted for common pool vessels in Amendment 16 were designed to apply only to those gears that caught specific stocks. This measure narrows the stocks for which the handgear permit categories will be subject to the trimester TAC based on recent catches. It makes no sense to restrict handgear fishing activity if an AM is triggered for a stock that is rarely caught by these vessels.

4.2.7 Trawl Gear Stowage Requirements

4.2.7.1 Option 1 – No Action

If adopted, trawl vessel would be required to stow their gear in the specified way when transiting areas.

Rationale: These requirements facilitate enforcing prohibitions on fishing within areas.

4.2.7.2 Option 2 – Removal of Trawl Gear Stowage Requirements *(Preferred Alternative)*

If adopted, this measure would remove the requirement that trawl vessels transiting areas stow their gear in the manner described by the Regional Administrator. This measure would remove this requirement for groundfish trawl fishing trips but does not modify any requirements imposed by other fisheries.

Rationale: The trawl gear stowage requirements are difficult to define in a manner that applies to all fishing vessels. In addition, with the adoption of VMS on all groundfish fishing vessels, there is less need for measures that are intended to make it easier to enforce the transiting restrictions. Because this requirement has outlived its usefulness it is being removed from the FMP.

Intentionally Blank

5.0 Alternatives Considered and Rejected

5.1.1 Annual Catch Limit Specifications

The Council considered adopting ABCs, and ACLs for FY 2013 in this action. These specifications were removed and will be submitted as a separate document.

5.1.2 At –Sea Monitoring Funding Mechanisms

The Council considered an option that would have provided additional ACE to sectors and the common pool in order to defray part of the costs of ASM. The options proposed that each sector (including the common pool) that incurs monitoring costs would be provided ACE to help defray the costs of sector monitoring programs (i.e. lease only sectors and state permit banks would not be provided additional ACE to defray monitoring costs). The program will target providing sufficient ACE to cover 100 percent of the direct costs of monitoring as defined in section 4.2.2.4. The additional ACE would be provided from one of two sources:

Sub-Option A: A percentage of the sub-ACL for commercial groundfish vessels.

Sub-Option B: A percentage of the difference between the ACL and the ABC for commercial groundfish vessels.

Once the amount of each stock available is determined, it would be distributed to the sectors and common pool in one of the following ways.

Sub Option C: The additional monitoring ACE will be distributed in proportion to each group's ACE. As an example, if a sector received 5 percent of the overall ACE for stock A, it will receive 5 percent of the amount available to defray monitoring costs.

Sub-Option D: The additional monitoring ACE will be distributed in proportion to the distribution of monitoring costs in the previous fishing year. As an example, if a sector incurred 5 percent of the total monitoring costs in the previous fishing year, the sector would receive 5 percent of the amount available to defray monitoring costs.

Sub-Option E: The monitoring cost per pound caught in the previous fishing year will be calculated for each sector (including the common pool). The sectors will be ranked in order of cost per pound with the lowest ranked sector at 1. Each sector (or the common pool) will receive a share for the available ACE calculated as:

$$\text{Share} = \text{Sector Rank}/(\text{Sum of all ranks})$$

This option was not pursued because it would need to be adopted by an amendment since it changes the way sector allocations are determined.

5.1.3 ASM Coverage Level Sufficient to Detect Monitoring Effects

It is difficult to evaluate the overall accuracy of discard estimates because it hinges on what is occurring on unobserved trips. Appropriate sampling techniques can minimize the errors of the estimates as long as the sampled trips are representative of the fishery as a whole. If there are monitoring effects – either due to non-random trip selection or changes in behavior when observers are on board – then the discard estimates may be biased.

Analyses of several metrics that can be measured on both observed and unobserved trips suggest that fishermen behave differently on unobserved trips than they do on observed trips. In the data analyzed to date, the differences are relatively small at the median (mean?). This does not, unfortunately, give any indication on whether discard rates are different on unobserved trips.

Since it is not possible to determine the amount of bias in discard rates on unobserved trips, the level of observer coverage is based on the amount of coverage needed to detect monitoring effects in metrics that can be measured on both observed and unobserved trips. This value would be determined by NMFS and communicated to sectors using procedures consistent with the APA. Sectors would incorporate this coverage level into their sector operations plans.

This option was not pursued because the Council could not identify the appropriate level of observer coverage necessary to detect monitoring effects.

5.1.4 Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History

This option considered establishing the scallop fishery sub-ACL for GB yellowtail flounder based on recent catch history. This option considered using the period 2002-2011, and was not pursued because the results were similar to other options that are being considered. Recent catch history is shown in Table 6. The percentage would have been 7.1 percent.

5.1.5 Modified Access to Year-Round Groundfish Closed Areas

This measure considered modifying modify access to areas that are currently identified as Northeast Multispecies closure areas, and would modify the boundaries of some of those areas. The changes that were considered are summarized below. This option was not pursued because it cannot be adopted in a framework action, and would need to be supported by an EIS.

Cashes Ledge Closure Area

The boundaries of the area currently defined as the Cashes Ledge closure would be modified. The area currently defined as the Cashes Ledge Habitat Closure would be removed. The closure area would be redefined as the Ammen Rock closure with the boundaries shown in Figure 8. All commercial fishing vessels using gear capable of catching groundfish are prohibited from fishing in the area. Only fishing with exempted gear (that is, gear deemed not capable of catching groundfish as defined by 50 CFR 648.2) is allowed in the area. Recreational fishing is allowed in the area.

Western Gulf of Maine Closure

The boundaries of the area currently defined as the Western Gulf of Maine Closure would be redefined. The modified area is shown in Figure 8. All commercial fishing vessels using gear capable of catching groundfish are prohibited from fishing in the area. Only fishing with exempted gear (that is, gear deemed not capable of catching groundfish as defined by 50 CFR 648.2) is allowed in the area. Recreational fishing is allowed in the area. The Western Gulf of Maine habitat closure area boundaries would be modified to match this area.

Nantucket Lightship Closed Area

The Nantucket Lightship Closed Area would be eliminated. The boundaries of the Nantucket Lightship Habitat Closure would be revised as shown on Figure 8.

Closed Area I

Groundfish fishing vessel access to CAI would be revised. Commercial groundfish fishing vessels (both sector and common pool) would be allowed into CAI from May 1 through February 15 when using appropriate gear. During this period mobile bottom tending groundfish gear would be allowed into the areas identified as the CAI Habitat Closure.

Trawl vessels would not be allowed into the area defined as the CAI Hook Gear Haddock SAP area during the period the SAP is open (October 1 - December 31).

Gear allowed into the area includes:

Trawl gear: Ruhle trawl, separator trawl, mini-Ruhle trawl, rope trawl, or other gear authorized.
Sink gillnet: Not allowed
Longline: Allowed
Handgear: Allowed
Recreational fishing: Not allowed

Closed Area II

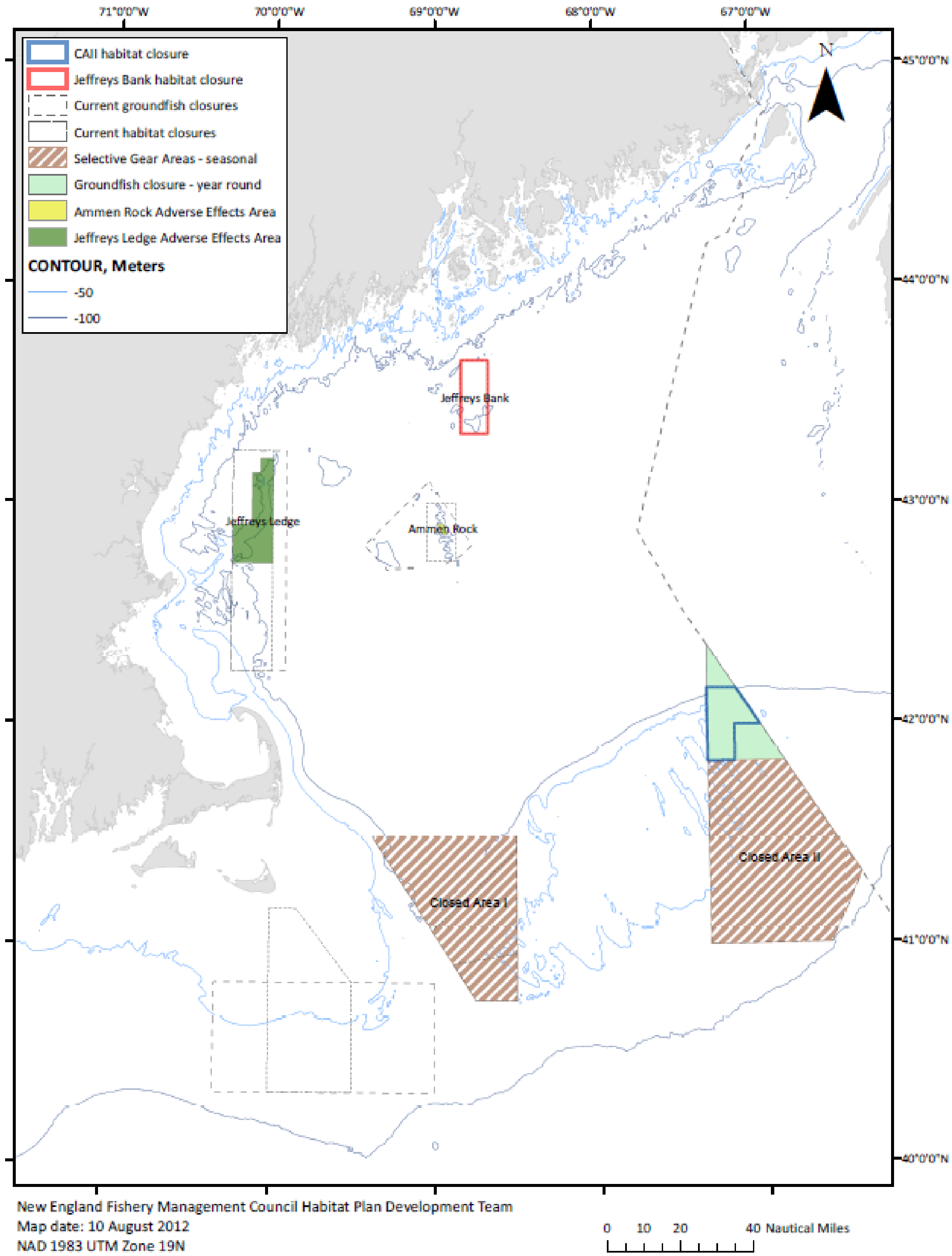
Groundfish fishing vessel access to CAII would be revised. Commercial groundfish fishing vessels (both sector and common pool) would be allowed into CAI from May 1 through February 15 when using appropriate gear. Vessels would only be allowed into the area shown in Figure 8 and described below.

Gear allowed into the area includes:

Trawl gear: Ruhle trawl, separator trawl, mini-Ruhle trawl, rope trawl, or other gear authorized
Sink gillnet: Not allowed
Longline: Allowed
Handgear: Allowed

Area: That portion of CAII that lies south of 41-50 N.

Figure 8 – Considered and rejected revised groundfish closed areas and modified access areas



5.1.6 GB Yellowtail Flounder Sector Fishing Area

The Council considered defining an area that would allow fishing by sector vessels on GB even if the sector had caught its GB yellowtail flounder ACE. This measure was not pursued because of complications with implementing the measure. The Council instead considered an option that modified how GB yellowtail founder discards are estimated for quota monitoring purposes.

5.1.7 Prohibition on Possession of GB Yellowtail Flounder

Because of expected low quotas for GB yellowtail flounder, the Council considered prohibiting the landing of GB yellowtail flounder by all commercial fishing vessels (including scallop fishing vessels) in FY 2013. In addition, in FY 2013 GB yellowtail flounder would not be specifically allocated to groundfish sectors. Since the stock would not be allocated to sector vessels, the primary AM for this stock in FY 2013 would be the requirement that FY 2013 overages of the U.S./Canada quota would be deducted from the FY 2013 quota, consistent with the provisions of the U.S/Canada Resource Sharing Understanding. AMs for the scallop fishery would also apply.

This option was not pursued because of concerns over discarding this stock, the effect on sectors with allocations of yellowtail flounder, and concerns that it would reduce accountability for catches of this stock.

5.1.8 100 percent Dockside Monitoring Requirement

This option would only be adopted if full retention (see Section 4.2.3.3) of regulated groundfish would also be adopted for sector vessels. This option would require that all sector groundfish trips be subject to dockside monitoring.

Rationale: Full retention may lead to chances in the sizes of fish that are landed. This dockside monitoring requirement will enable more accurate evaluation of such changes so that they are detected as rapidly as possible.

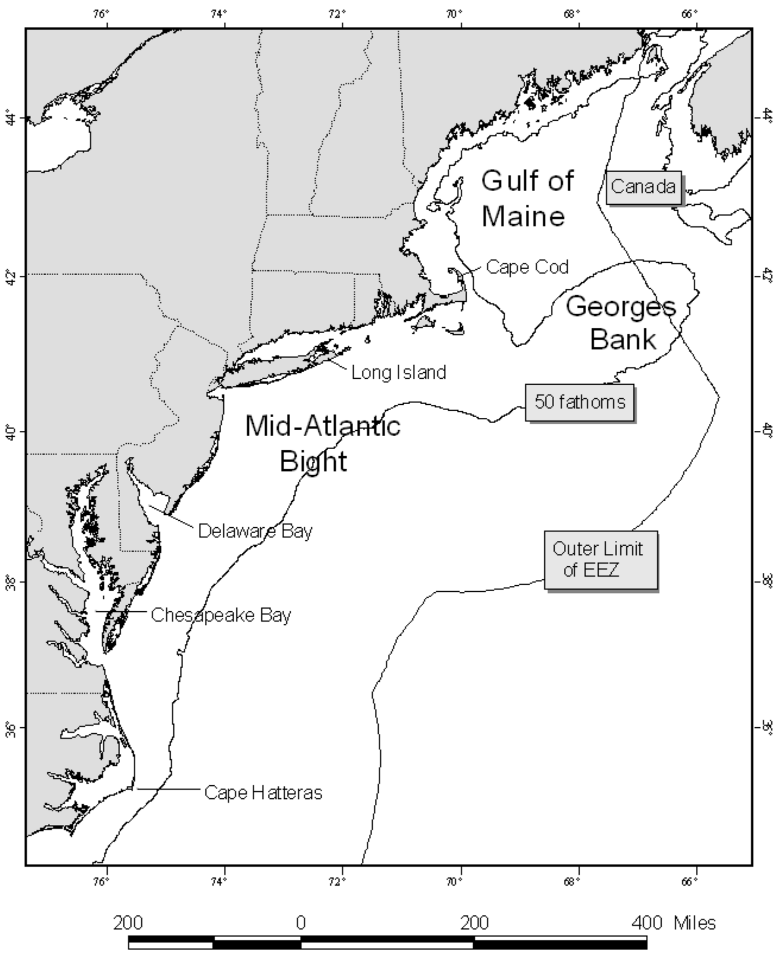
6.0 Affected Environment

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 9) includes the area from the Gulf of Maine south to Cape Hatteras, North Carolina. It extends from the coast seaward to the edge of the continental shelf and offshore to the Gulf Stream (Sherman et al. 1996). The continental slope includes the area seaward of the shelf, out to a depth of 6,562 feet (ft) [2,000 meters (m)]. Four distinct sub-regions comprise the NMFS Northeast Region: the Gulf of Maine, Georges Bank, the southern New England/Mid-Atlantic region, and the continental slope. Sectors primarily fish 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 and biological environment focuses on these sub-regions. Information in this section was extracted from Stevenson et al. (2004).

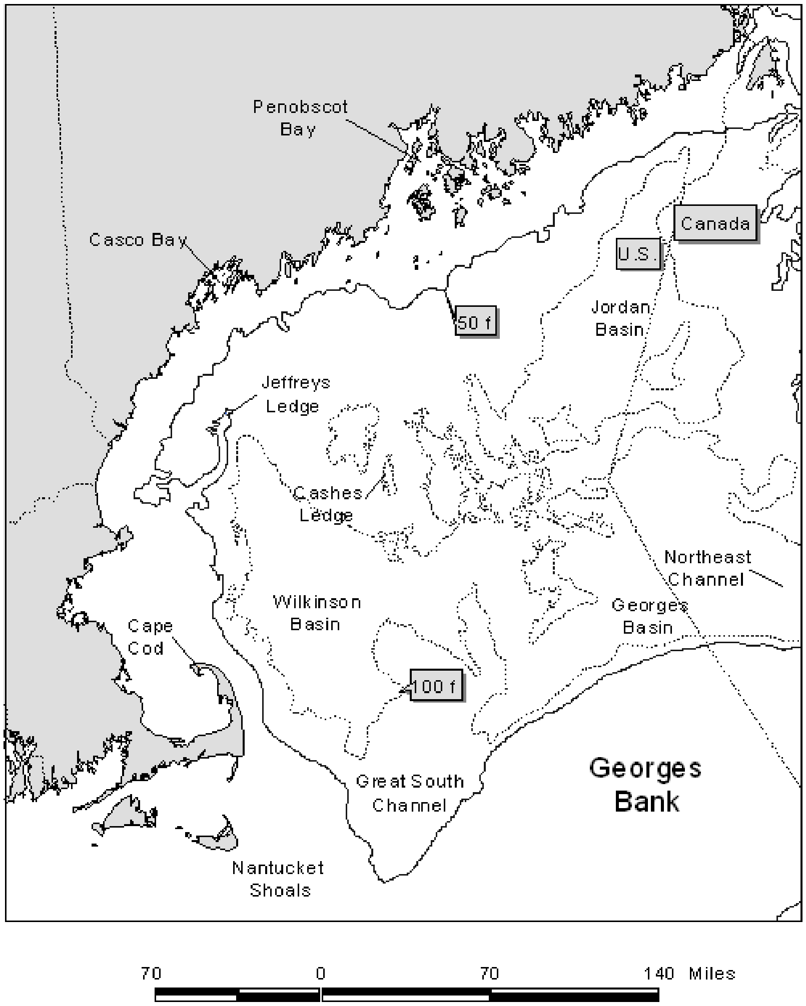
Figure 9 - Northeast U.S Shelf Ecosystem



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 10). 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 10 - Gulf of Maine



The Gulf of Maine is an enclosed coastal sea that was glacially derived and is characterized by a system of deep basins, moraines, and rocky protrusions (Stevenson et al. 2004). The Gulf of Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast (Stevenson et al. 2004). Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[1] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a 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 to 131 ft (20 to 40 m), except off eastern Maine where a gravel-covered plain exists to depths of at

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

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.

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

The most common groups of benthic invertebrates in the Gulf of Maine reported by Theroux and Wigley (1998) in terms of numbers collected were annelid worms, bivalve mollusks, and amphipod crustaceans. 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 to 459 ft (60 to 140 m) within cold Gulf of Maine Intermediate Water:[2] 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 to 46 °F (7 to 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 greater than 46 °F (8°C): upper slope fauna extending into the Northeast Channel.

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

- Deepwater/Slope and Canyon: offshore hake, blackbelly rosefish, Gulf stream flounder;
- Intermediate/Combination of Deepwater Gulf of Maine-Georges Bank and Gulf of Maine-Georges Bank Transition: silver hake, red hake, goosefish (monkfish);
- Shallow/Gulf of Maine-Georges Bank Transition Zone: Atlantic cod, haddock, pollock;

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

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

- 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 to 492 ft [3 to 150 m depth]), elongated ((100 miles [mi] (161 kilometer [km] wide) by 20 mi (322 km long)) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Figure 9). 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 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 and 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 and 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 to 656 ft [150 to 200 m]) with relatively slow currents and fine bottom sediments of silt, clay, and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers.

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 less than 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 to 656 ft (80 to 200 m), where fine-grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range. Dominant fauna include amphipods, copepods, euphausiids, and starfish.

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

6.1.3 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 9). 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 between 62 to 124 ft (100 and 200 km) offshore where it transforms to the slope (328 to 656 ft [100 to 200 m water depth]) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson et al. 2004). Like the rest of the continental shelf, 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 to 31 mi (10 to 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 to 10 with heights of about 7 ft (2 m), lengths of 164 to 328 ft (50 to 100 m), and 0.6 to 1 mi (1 to 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 and Zetlin 2000). In general, reefs are important for attachment sites, shelter, and food for many species. In addition, fish predators, such as tunas, may be 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 either 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 (Theroux and Wigley 1998). Pratt (1973) identified three broad faunal zones related to water depth and sediment type:

1) The “sand fauna” zone is dominated by polycheates and was defined for sandy sediments (1 percent or less silt) that are at least occasionally disturbed by waves, from shore out to a depth of about 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 subregion during spring and fall.[4]

- Northern (boreal) portions: hake (white, silver, red), goosefish (monkfish), longhorn sculpin, winter flounder, little skate, and spiny dogfish;
- Warm temperate portions: black sea bass, summer flounder, butterfish, scup, spotted hake, and northern searobin;
- Water of the inner shelf: windowpane flounder;
- Water of the outer shelf: fourspot flounder; and

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

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

6.1.4 Habitat requirements of groundfish (focus on demersal lifestages)

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 10 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 10). Note that EFH for the egg stage was included for species that have a demersal egg stage (winter flounder and ocean pout); all other species' eggs are found either in the surface waters, throughout the water column, or are retained inside the parent until larvae hatch. The egg habitats of these species are therefore not generally subject to interaction with gear and are not listed in Table 15.

Table 10 – Summary of Geographic Distribution, Food Sources, Essential Fish Habitat Features and Commercial Gear used to Catch Each Species in the Northeast Multispecies Fishery Management Unit

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat: Water Depth	Essential Fish Habitat: Substrate	Commercial Fishing Gear Used
Atlantic cod	Gulf of Maine, Georges Bank and southward	Omnivorous (invertebrates and fish)	(J): 82-245 ft (25-75 m)	(J): Cobble or gravel bottom substrates	Otter trawl, bottom longlines, gillnets
			(A): 33-492 ft (10-150 m)	(A): Rocks, pebbles, or gravel bottom substrate	
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)	(J): Pebble and gravel bottom substrates	Otter trawl, bottom longlines, gillnets
			(A): 131-492 ft (40-150 m)	(A): Broken ground, pebbles, smooth hard sand, smooth areas between rocky patches	
Acadian redfish	Gulf of Maine, deep portions of Georges Bank and Great South Channel	Crustaceans	(J): 82-1,312 ft (25-400 m)	(J): Bottom habitats with a substrate of silt, mud, or hard bottom	Otter trawl
			(A): 164-1,148 ft (50-350 m)	(A): Same as for (J)	
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)	(J): Bottom habitats with aquatic vegetation or substrate of sand, mud, or rocks	Otter trawl, gillnets
			(A): 49-1,198 ft (5-365 m)	(A): Hard bottom habitats including artificial reefs	
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)	(J): Bottom habitat with a substrate of sand, gravel, or clay	Otter trawl, bottom longlines
			(A): 328-2,297 ft (100-700 m)	(A): Same as for (J)	
			(J): 262 ft (<80 m)	(J): Bottom habitat, often smooth areas near rocks or algae	

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat: Water Depth	Essential Fish Habitat: Substrate	Commercial Fishing Gear Used
Ocean Pout	Gulf of Maine, Cape Cod Bay, Georges Bank, southern New England, middle Atlantic south to Delaware Bay	Juveniles feed on amphipods and polychaetes. Adults feed mostly on echinoderms as well as on mollusks and crustaceans	(E): <164 ft (<50 m)	(E): Bottom habitats, generally hard bottom sheltered nests, holes, or crevices where juveniles are guarded.	Otter trawl
			(L): <164 ft (<50 m)	(L): Hard bottom nesting areas	
			(J): 262 ft (<80 m)	(J): Bottom habitat, often smooth areas near rocks or algae	
			(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)	(J): Bottom habitat with seagrass beds or substrate of mud or fine-grained sand	Otter trawl, gillnets
			(A): 16-1,066 ft (5-325 m)	(A): Bottom habitats with substrate of mud or fine grained sand	
Yellowtail flounder	Gulf of Maine, southern New England, Georges Bank	Amphipods and polychaetes	(J): 66-164 ft (20-50 m)	(J): Bottom habitats with substrate of sand or sand and mud	Otter trawl
			(A): 66-164 ft (20-50 m)	(A): Same as for (J)	
American plaice	Gulf of Maine, Georges Bank	Polychaetes, crustaceans, mollusks, echinoderms	(J): 148-492 ft (45-150 m)	(J): Bottom habitats with fine grained sediments or a substrate of sand or gravel	Otter trawl
			(A): 148-574 ft (45–175 m)	(A): Same as for (J)	
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)	(J): Bottom habitats with fine grained substrate	Otter trawl
			(A): 82-984 ft) (25-300 m)	(A): Same as for (J)	

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat		Commercial Fishing Gear Used
			Water Depth	Substrate	
Winter flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/southern New England	Polychaetes, crustaceans	(E): 16 ft (<5 m)	(E): Bottom habitats with a substrate of sand, muddy sand, mud, and gravel	Otter trawl, gillnets
			(J): 0.3-32 ft (0.1-10 m) (3-164 ft age 1+) (1-50 m)	(J): Bottom habitats with a substrate of mud or fine grained sand	
			(A): 3.2-328 ft (1-100 m)	(A): Bottom habitats including estuaries with substrates of mud, sand, gravel	
Atlantic wolffish	Gulf of Maine & Georges Bank	Mollusks, brittle stars, crabs, and sea urchins	(J): 131.2-787.4 ft (40-240 m)	(J): Rocky bottom and coarse sediments	Otter trawl, bottom longlines, and gillnets
			(A): 131.2-787.4 ft (40-240 m)	(A): Same as for (J)	
Windowpane flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/southern New England	Juveniles mostly crustaceans; adults feed on crustaceans and fish	(J): 3.2-328 ft (1-100 m)	(J): Bottom habitats with substrate of mud or fine grained sand	Otter trawl
			(A): 3.2-574 ft (1-75 m)	(A): Same as for (J)	

6.1.5 Essential Fish Habitat (EFH) 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 surfclam and ocean quahog FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and Federal waters throughout the Northeast U.S. Shelf Ecosystem. Table 15 summarizes the EFH 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 NMFS Northeast Region website at http://www.nero.noaa.gov/hcd/index2a.htm. In general, EFH for species and life stages that rely on the seafloor for shelter (e.g., from predators), reproduction, or food is vulnerable to disturbance by bottom tending gear. The most vulnerable habitat is more likely to be hard or rough bottom with attached epifauna.

6.1.6 Gear Types and Interaction with Habitat

Groundfish vessels fish for target species with a number of gear types: trawl, gillnet, fish pots/traps, and hook and line gear (including jigs, handline, and non-automated demersal longlines) as part of the FY 2012 operations. This section discusses the characteristics of each of the proposed gear types as well as the typical impacts to the physical habitat associated with each of these gear types.

6.1.6.1 Gear Types

Table 11 - Description of the Gear Types Used by the Multispecies Fishery

	Gear Type			
	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 inches (38 cm) long, 3 to 6 inches (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 inches [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/ Duration of Use	Tows last for several hours	Frequency of trending changes from daily (when targeting groundfish) to semi-weekly (when targeting monkfish and skate)	Usually set for a few hours at a time	Depends upon cast/target species

6.1.6.1.1 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 to 558 ft (110 m to 170 m) and requires the use of large vessels (Sainsbury 1996). Successful mid-water trawling requires the effective use of various electronic aids to find the fish and maneuver the vessel while fishing (Sainsbury 1996). Tows typically last for several hours and catches are large. 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 (Northeast Region Essential Fish Habitat Steering Committee 2002). The specific gear design used is often a result of the target species (whether found on or off the bottom) as well as the composition of the bottom (smooth versus rough and soft versus hard). A number of different types of bottom otter trawl used in the Northeast are specifically designed to catch certain species of fish, on specific bottom types, and at particular times of year. 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, to get fish like flounders. Flounders lie in contact with the seafloor and flatfish trawls look to get flounder up off the bottom and into the net. It is used on smooth mud and sand bottoms. A high-rise or fly net with larger mesh has a wide net opening and is used to catch demersal fish that tend to rise higher off the bottom than flatfish (Northeast Region Essential Fish Habitat Steering Committee 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 to 2.0 ft (0.5 to 0.6 m) above the bottom (Carr and Milliken 1998). Although the doors of the trawl still ride on the bottom, underwater video and observations in flume tanks have confirmed that the sweep in the raised-footrope trawl has much less contact with the seafloor than the traditional cookie sweep (Carr and 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 2009a).

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 (NOAA 2009).

6.1.6.1.2 Gillnet Gear

Sectors would also use individual sink/anchor gillnets which are about 295 ft (90 m) long. They are usually fished as a series of 5 to 15 nets attached end-to-end. A vast majority of "strings" consist of 10 gillnets. Gillnets typically have three components: the leadline, webbing, and floatline. In New England, leadlines are approximately 66 lbs/net (30 kilogram (kg)/net). Webs are monofilament, with the mesh size depending on the species of interest. Nets are anchored at each end using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. For New England groundfish, frequency of tending gillnets ranges from daily to semiweekly (Northeast Region Essential Fish Habitat Steering Committee 2002).

A bottom gillnet is a large wall of netting equipped with floats at the top and lead weights along the bottom. Bottom gillnets are anchored or staked in position. Fish are caught while trying to pass through the net mesh. Gillnets are highly selective because the species and sizes of fish caught are dependent on the mesh size of the net. 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 to 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.

6.1.6.1.3 Fish Traps/Pots

Some sectors would use fish traps/pots. This EA assumes these traps/pots are similar to lobster pots. Lobster pots are typically rectangular and consist of two sections, the chamber and the parlor. The chamber has an entrance on both sides of the pot and usually contains the bait. Lobsters enter the parlor via a tunnel (Everhart and Youngs 1981). Escape vents in both areas of the pot minimize the retention of sub-legal sized lobsters (DeAlteris 1998).

Lobster pots are fished as either a single pot per buoy (although two pots per buoy are used in Cape Cod Bay, and three pots per buoy in Maine waters), or a "trawl" or line with up to one hundred pots. The Northeast Fishery Science Center (NEFSC 2002) provides the following important features of lobster pots and their use:

- About 95 percent of lobster pots are made of plastic-coated wire.

- Floating mainlines may be up to 25 ft (8 m) off bottom; sinking groundlines are used where entanglements with marine mammals are a concern.
- Soak time depends on season and location - usually 1 to 3 days in inshore waters in warm weather to weeks in colder waters.
- Offshore pots are larger [more than 4 ft (1 m) long] and heavier (~ 100 lbs or 45 kg), with an average of about 40 pots/trawl and 44 trawls/vessel. They have a floating mainline and are usually deployed for a week at a time.

6.1.6.1.4 Hook and Line Gear

6.1.6.1.4.1 Hand Lines/Rod and Reel

Sectors would also use handlines. The simplest form of hook and line fishing is the hand line. 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. Hand lines can be carried by currents until retrieved or fished in such a manner as to hit bottom and bounce (Stevenson et al. 2004). Fishermen use hand lines as well as rods and reels in the Northeast Region to catch a variety of demersal species.

6.1.6.1.4.2 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.

6.1.6.1.4.3 Bottom Longlines

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 to 24 lbs (9 to 11 kg) anchors. The mainline is a parachute cord. Gangions are typically 16 in (40 cm) long and 3 to 6 in (1 to 1.8 m) apart and are made of shrimp twine. These bottom longlines are usually set for a few hours at a time (Northeast Region Essential Fish Habitat Steering Committee 2002).

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.

6.1.6.2 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. This report identified a number of possible effects of bottom otter trawls on benthic habitats (International Council for the Exploration of the Seas 2000). The International Council for the Exploration of the Seas report 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 <u>changes that are always permanent</u> 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 <u>changes that may be permanent</u> 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;
- <u>Changes are not likely to be permanent</u> 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
- <u>Changes are not likely to be permanent</u> 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 (National Research Council 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 Mid-Atlantic Fishery Management Council (MAFMC) (NEFSC 2002) 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 2002). Duration of impacts to physical structures from these gear types would be expected to last days to months on soft mud, but could be permanent on hard bottom clay structures along the continental slope. Impacts to mud would be caused by gillnet lead lines and anchors. Physical habitat impacts from sink gillnets and bottom longlines on sand would not be expected.

Amendment 13 also summarized the contents of a second expert panel report, produced by the Pew Charitable Trusts and entitled "Shifting Gears: Addressing the Collateral Impacts of Fishing Methods in U.S. Waters" (Morgan and Chuenpagdee 2003). This group evaluated the habitat effects of 10 different commercial fishing gears used in U.S. waters. The report concluded that bottom trawls have relatively high habitat impacts; bottom gillnets and pots and traps have low to medium impacts; and bottom longlines have low impacts. As in the International Council for 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).

Going beyond Amendment 13 analyses, one purpose of the ongoing Omnibus Essential Fish Habitat Amendment 2 (OA2) is to evaluate 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 US Federal waters (between 3-200 nm offshore) from Cape Hatteras to the US-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.

6.1.7 Physical habitat and EFH in the potential sector exemption areas

Because fish habitats vary spatially in their physical and biological characteristics and therefore in their vulnerability to fishing, when considering changes to area-based management, it is important to evaluate the habitat characteristics of potential management areas, and the use of those habitats by managed species.

The purpose of this section is to characterize habitats within the exemption areas, specifically to:

(1) Review substrate distribution, depth, and other physical habitat characteristics.

(2) Discuss how the exemption areas compare to other locations in terms of habitat vulnerability.

(3) Highlight any areas of overlap between exemption areas and Essential Fish Habitat (EFH) designations for species of interest.

(4) For species with designated EFH in the exemption areas, identify whether they have known associations with habitat types that are more vulnerable to accumulating adverse effects, such that allowing fishing exemptions might have negative impacts on the productivity of those species.

6.1.7.1 Benthic habitat characterization: energy, substrate, and vulnerability

Figure 11 overlays the current draft range of habitat management area options with the existing habitat management areas, the exemption areas and the groundfish closed areas. Within this region, using the SASI model, habitats were defined based on natural disturbance regime (Figure 12) and dominant substrate (Figure 13)[5]. As noted above, 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 (Figure 14).

Habitat vulnerability to specific bottom-tending gear types is represented at a uniform 10x10 km grid resolution. In many cases, grid cells of this size include a mix of dominant substrate types, which has the effect of smoothing the model outputs. This resolution was selected because in some parts of the domain the underlying substrate data are not high resolution, and the primary data source for fishing effort, vessel trip reports, are not very spatially precise. However, as this resolution is relatively coarse in comparison to some management area sizes, vulnerability scores should be evaluated cautiously.

Table 12 summarizes the energy, dominant substrate, and vulnerability characteristics of the five exemption areas. Bearing in mind that energy at the seabed is in reality a gradient rather than a high/low dichotomy, Georges Bank and the management areas contain mostly high energy habitats, while the Gulf of Maine management areas contain mostly low energy habitats, with the exception of the topographic highs on Jeffreys Ledge, Stellwagen Bank, Platts Bank, and Cashes Ledge. Substrate distributions are very patchy, with larger grain sizes evident along the northern margin of Georges Bank and on the relatively shallow banks and ledges in the Gulf of Maine. (Inshore areas also contain areas of complex substrates but are largely outside the model domain.)

Comparing SASI vulnerability scores for the exemption areas to those of existing or modified/new habitat management areas (Figure 14) may be a useful way to indicate whether allowing exemptions will have negative impacts on EFH[6]. Overall, trawl vulnerability scores fall into a fairly narrow range. In

[5] Note that throughout the SASI documentation, gravel is used as a generic category that encompasses substrates of varying grain sizes from granule to pebble to cobble to boulder.

[6] In this document, the absolute values of vulnerability scores are shown, with larger numbers indicating greater vulnerability. Previous SASI-related documents have reported vulnerability values with negative signs, the way they come out of the model. Color ramps on all documents are the same, i.e. redder colors indicate greater vulnerability to a particular gear type.

comparison to other sets of management areas (shown using different colors on Figure 11), the vulnerability scores in the exemption areas are generally lower. The histograms show the number of grid cells within each set of areas that fall within particular score ranges[7]. Panel 1 shows the scores for the entire model domain subject to trawl gear activity, which includes all areas shallower than 268 m. Panel 2 shows the scores for the exemption areas, in aggregate. Panels 3 and 4 show the scores for the two sets of LISA clusters, which were used as a foundation for habitat management area development and encompass the highest vulnerability cells. Panel 5 shows the scores for cells in the modified or new habitat management areas only, and Panel 6 shows the scores for all habitat management areas, existing, modified, and new. The management areas represented by panel 6 are excluded from the exemption areas. Overall, the sets of areas represented by panels 3-6 include cells with much higher vulnerability scores than the exemption areas.

7 When selecting grid cells to represent in each histogram, whole grid cells were used and therefore the same grid cells are represented in more than one histogram. Also, scaled vulnerability values are shown because they better account for varying grid cells sizes at the edges of the model domain.

Figure 11 – Overlap between existing (Multispecies Amendment 13) habitat closed areas (green), year round groundfish closed areas (red outline), Framework 48 exemption areas (hatched), and draft range of options for habitat management areas under development in Omnibus EFH Amendment 2 (pink outline/pink fill).

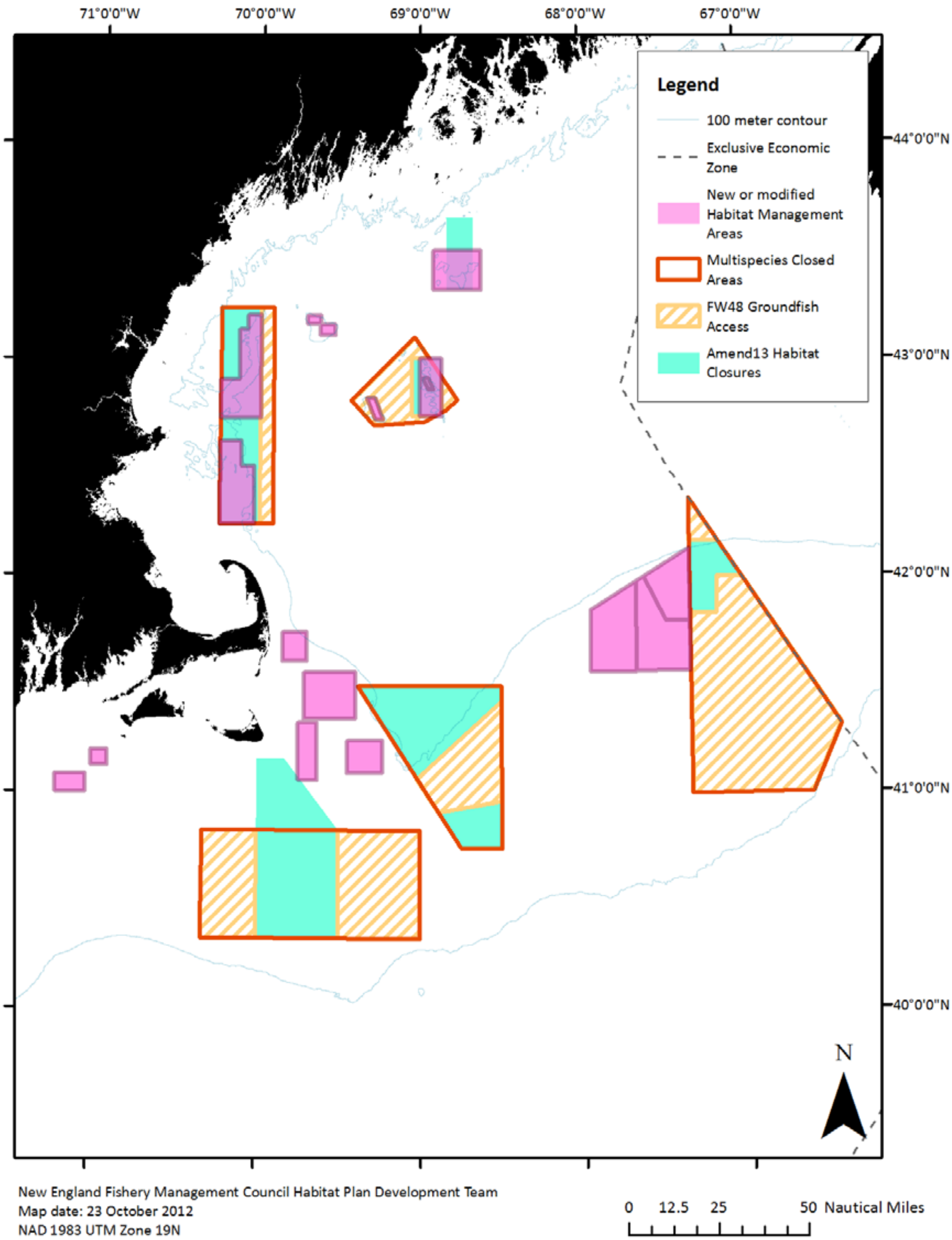


Figure 12 – Energy and depth. Color shading of the depth layer breaks at 500 m to allow for finer classification of shallow depths and visual feature resolution. High energy areas on Platts Bank and Cashes Ledge are somewhat difficult to see, but correspond to locations shallower than 60 m.

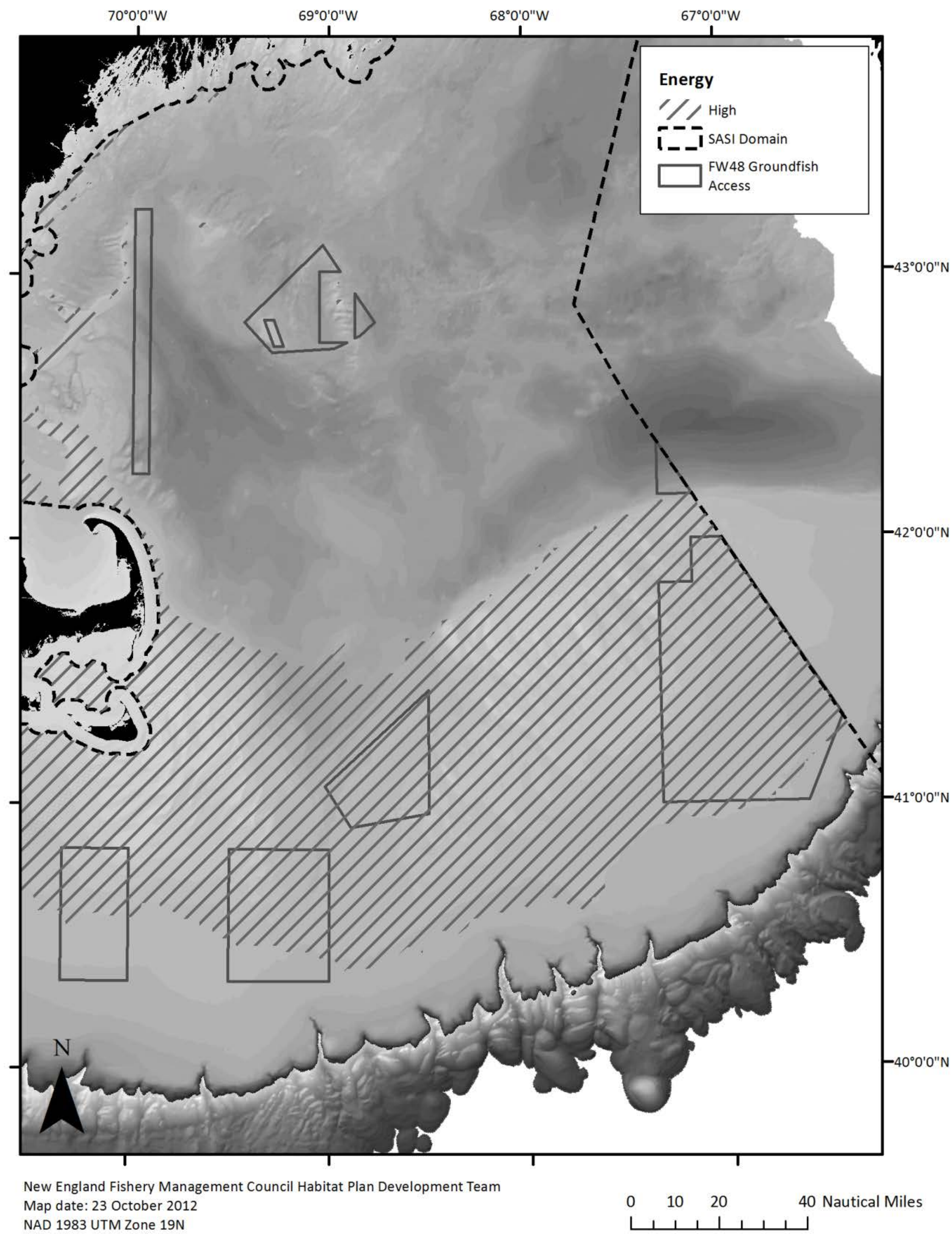


Figure 13 - Dominant substrate classification. Grid cell boundaries are not shown, but size of the grid cells and thus the resolution of the substrate map is related to the distance between sample locations.

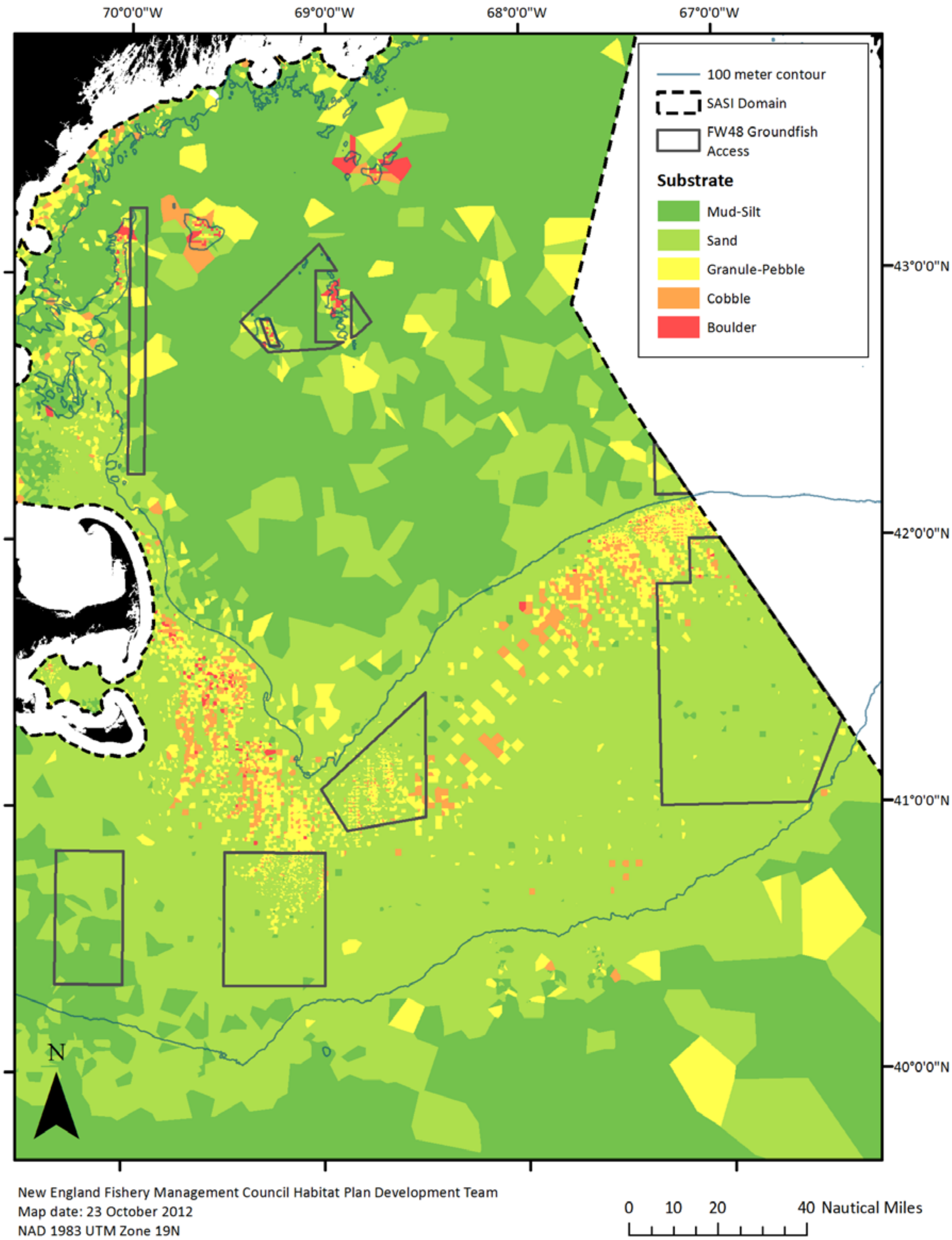


Figure 14 – Overlay of Framework 48 Exemption Areas with SASI habitat vulnerability maps for trawl gear. Blue tones indicate locations estimated to be less vulnerable to bottom trawl gear and red tones indicate locations estimated to be more vulnerable. Grid cell size in the model is 10 km by 10 km. The coral and red outlined cells (= LISA clusters) show groupings of high vulnerability that were evaluated by the Habitat PDT as candidate habitat management areas.

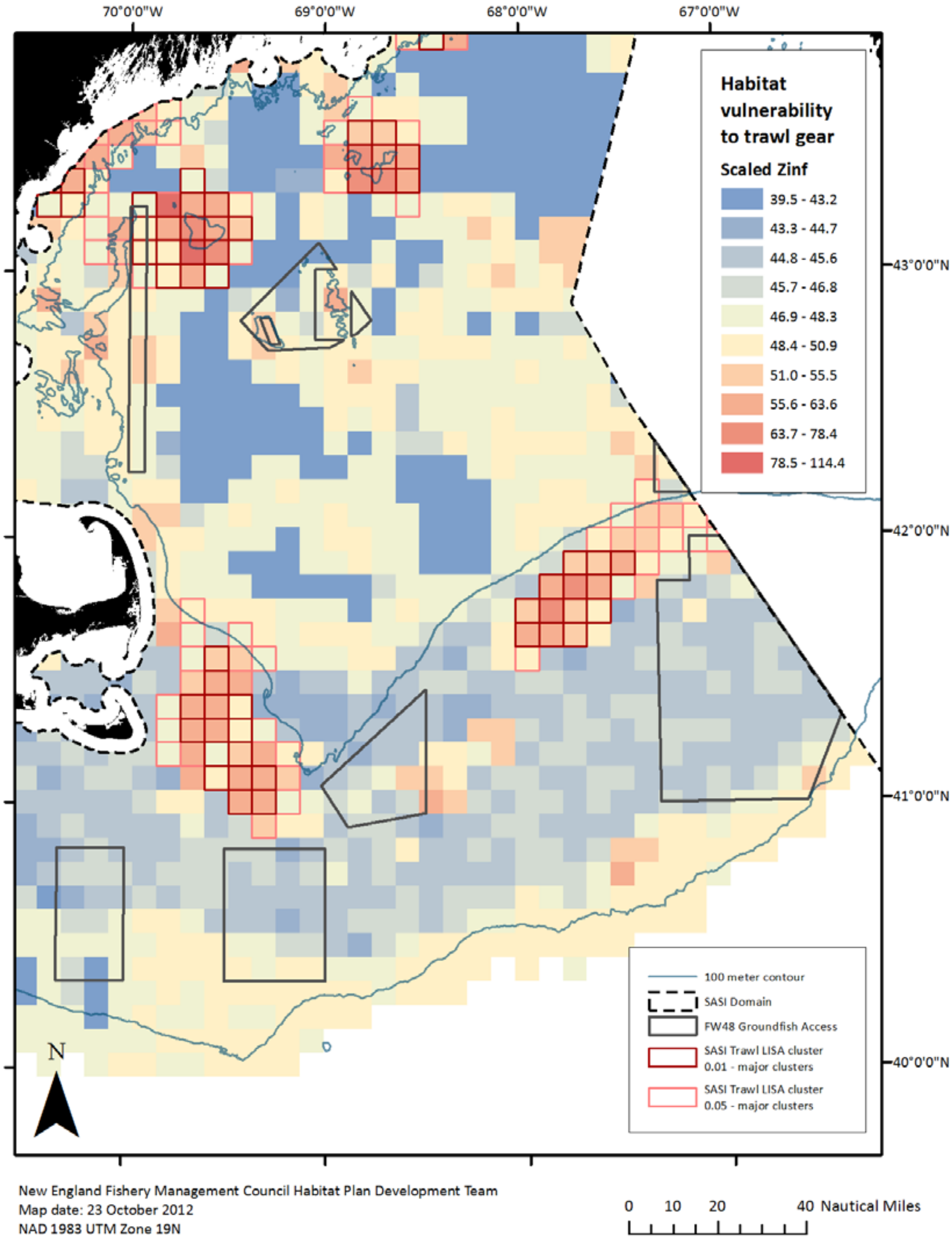
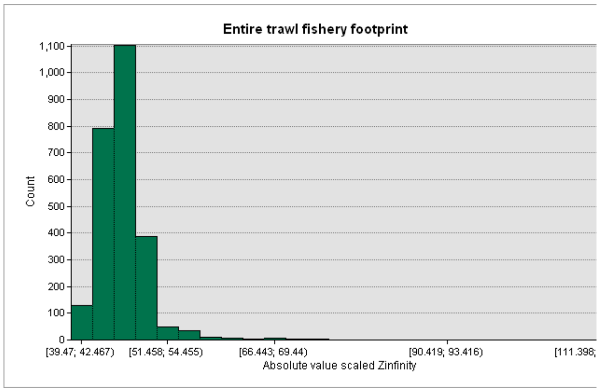
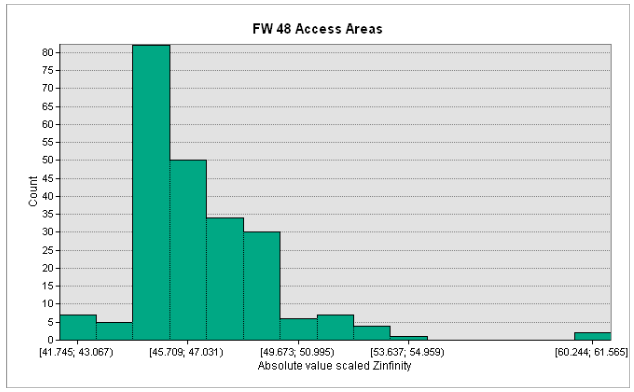


Figure 15 – Distribution of trawl vulnerability scores for SASI grid cells in different locations.

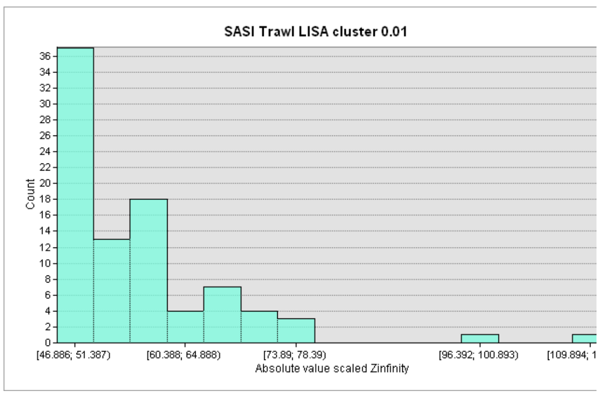
(1) Entire domain



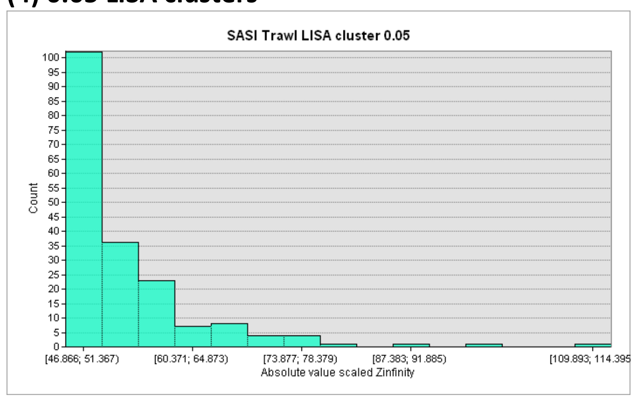
(2) FW 48 Exemption Areas



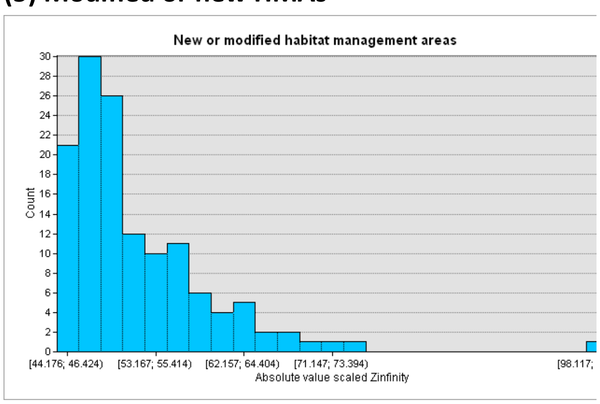
(3) 0.01 LISA clusters



(4) 0.05 LISA clusters



(5) Modified or new HMAs



(6) Existing, modified, or new HMAs

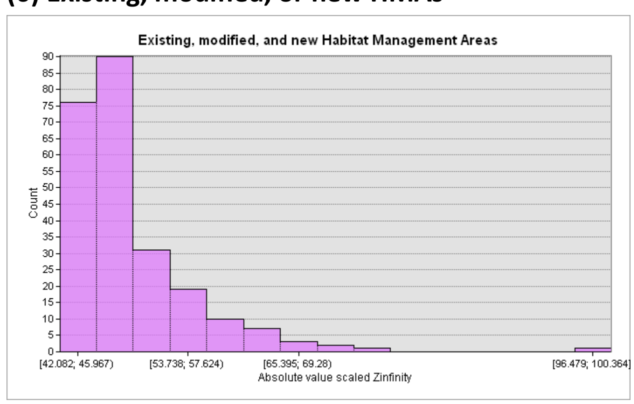


Table 12 – Characteristics of groundfish exemption areas

Area	Energy	Dominant substrate	Vulnerability to bottom otter trawl gears
Closed Area I exemption area. A single sub-area, with the Great South Channel along the western edge and the eastern edge overlapping Little Georges.	High energy.	The exemption area is generally sandy, with granule pebble features running north to south. There are occasionally cobble-dominated areas within these granule-pebble features.	Mostly low. Moderate to high vulnerability grid cells in the eastern part of the area may be an artifact of grid cell size more so than sediment composition and inferred habitat features.
Closed Area II exemption area. Two sub-areas, one smaller triangular shaped off the northern edge of Georges Bank, and a much larger area to the south.	Northern sub-area is low energy. Southern sub-area is high energy, transitioning to low in the southeast corner where the bank drops off into deeper water.	The northern sub-area is not mapped at high resolution, but appears to be sand-dominated. The southern sub-area is largely sand-dominated, although the northern part contains the southern edges of gravel-dominated features that run northwest to southeast across Georges Shoal and the Northern Edge.	Low. Estimated vulnerability slightly higher over the gravel features, and slightly higher in the deeper, lower energy northern subarea.
Nantucket Lightship Closed Area exemption area. Two sub-areas, west and east of the Nantucket Lightship habitat closure.	High, transitioning to low on the southern margin of each subarea in deeper water.	The western portion of the exemption area is sandy to the north and transitions to muddier habitats towards the south with increasing water depth. The eastern portion of the exemption area is generally sandy, with granule pebble features in the northeastern corner. There are occasionally cobble-dominated areas within these granule-pebble features. Asia Rip is an example of one of these features.	Low. Increases slightly in the southern parts of each subarea which are deeper and lower energy.
Cashes Ledge exemption area.	Low. Only the shallowest parts of Cashes ledge itself are classified as high energy, and these are within the Cashes Ledge habitat closure and are not part of the exemption area.	In general, the parts of the Cashes Ledge groundfish closure that comprise the exemption area are deeper and muddier than those areas within the existing Cashes Ledge habitat closure and the proposed Fippennies Ledge habitat management area, which area excluded from the exemption area. However, substrate data for the area are relatively sparse except for on Cashes Ledge and Fippennies Ledge themselves.	Relatively low but also somewhat uncertain as SASI base grid habitat characterization data are sparse.
Western Gulf of Maine exemption area.	Low. Only the shallower parts of Stellwagen Bank and Jeffreys Ledge are low energy. These areas are located within the	In general, the shallower gravel-dominated areas on Stellwagen Bank and Jeffreys Ledge slope west to east across the shorter dimension of this long, narrow exemption area, and transition to mud substrates.	Relatively low but somewhat uncertain as SASI base grid habitat characterization data are sparse. Potentially higher

Area	Energy	Dominant substrate	Vulnerability to bottom otter trawl gears
	WGOM habitat closure, but are not part of the exemption area.	However, in the southern part of the exemption area Wildcat Knoll is shallower and is known to contain more diverse substrate types based on submersible work (although the substrates in this area are not well characterized in the SASI base grid).	over Wildcat Knoll.

6.1.7.2 Essential Fish Habitat designations in the exemption areas

Another way to evaluate the exemption areas is in terms of whether they overlap with EFH designation areas for particular species. On the series of figures that follow, adult EFH is shaded grey, and juvenile EFH (if designated separately) is hatched. The designations shown are draft designations that will take effect once OA2 is implemented, which is expected in mid-2014. Details can be found in this document: http://www.nefmc.org/habitat/planamen/efh_amend_2/June_2012_EFH_and_HAPC_alternatives.pdf.

Similar to the existing EFH designations, the updated EFH designations are largely based on a long time series of fishery-independent trawl survey data. Depending on the species, a percentage of the distribution is selected as the foundation for the designation, usually 75 or 90 percent. The base grid cell size for the EFH designations is the ten minute square of latitude/longitude. The EFH designation coverage is modified in many cases to add additional ten minute squares according to known depth preferences for the species and lifestage, or to remove portions of ten minute squares that do not match known depth preferences for the species and lifestage. EFH designations correspond to the exemption areas as follows. Some of these species have documented associations with particular habitat types (Table 13).

Species with low ACLs:

Atlantic cod – Both juvenile and adult cod have designated EFH in all five exemption areas (Table 13). However, since the juvenile designation is limited to waters shallower than 120 m, and the adult designation is limited to waters shallower than 160 m, a relatively small proportion of the WGOM exemption area has cod EFH. Similarly, the deepest parts of the CL exemption area and the northern triangle of the CAII exemption area do not contain cod EFH.

Cod are demersal gadids, usually found within two meters or so of the bottom (Collette and Klein-MacPhee 2002). Larger fish generally stay closer to the bottom unless feeding in the water column. They are associated with a variety of bottom types, but prefer coarser substrates. Analysis of trawl survey data (all sizes) from the NMFS survey stratum that includes the Stellwagen Bank National Marine Sanctuary (SW Gulf of Maine) showed a significant positive relationship with bottom reflectance, i.e., higher catches on harder bottom (Auster et al. 2001). Acoustic tagging studies and underwater observations in this same area have revealed that cod are associated with gravel and deep (50-100 m) boulder reef habitats (Lindholm and Auster 2003, Auster and Lindholm 2005, Lindholm et al. 2007). Some adults remained on the reef while others departed the area rapidly following release. Video surveys and hook-and-line sampling suggested that cod are most abundant in complex habitats such as rocky ledge and cobble habitats. Analysis of 1998-2002 spring and fall NEFSC trawl survey data (kg/tow, all sizes) in relation to sediment type showed that cod catch rates were higher in coarse sand, fine rock, and coarse rock substrates (ten minute squares with mean grain sizes of 0.25-8 mm) and that cod consistently distinguished fine rock (2-8 mm) from all finer-grained substrates (Methratta and Link 2006b).

Juvenile settlement studies have mainly been conducted in the laboratory and in nearshore locations, even though young-of-the-year cod are known to also utilize deeper, offshore habitats. Inshore studies generally confirm a preference among young-of-the-year juveniles for structured bottom habitats that provide shelter from predators (see, for example, Gotceitas and Brown 1993; Gotceitas et al. 1995; Borg et al. 1997; Linehan et al. 2001; Lazzari and Stone 2006).

Offshore habitat association studies on Georges Bank indicate that there is a narrow window when cod are closely associated with gravel substrates. Submersible studies on eastern Georges Bank (Lough et al. 1989, Valentine and Lough 1991) showed that recently-settled cod and haddock are widely dispersed over the bank and are present on a range of sediment types from sand to gravelly sand to gravel pavement. However, by late July and August, these fish occur predominantly on the gravel pavement habitat on the northeastern part of the bank and are absent from sandy areas. It is not clear if this represents low survival on sand, or migration to gravel habitats. During late summer, as they continue to grow, they are carried to the east and southeast in the residual bottom current, and by fall they are more widely dispersed and are no longer confined to gravel pavements.

Studies in the SWGOM have found very young juvenile cod along the margins of boulder reefs (Lindholm and Auster 2003, Auster and Lindholm 2005, Lindholm et al. 2007). These juveniles would hide amongst the cover provided by rocky substrate and epifauna when disturbed. Grabowski et al. (in press) analyzed trawl survey data from mid-coast Maine and reported that larger juveniles (10-25 cm) were far more abundant on gravel than on mud or sand bottom. Examination of tows conducted at similar depths demonstrated that juvenile cod densities on gravel were more abundant than those on either sand (20-35 m) or mud (35-50 m).

Winter flounder are found in relatively shallow water, so there is juvenile and adult EFH designated in the shallower parts of the three GB exemption areas (Table 13). There is no overlap between winter flounder EFH and the WGOM or CL exemption areas. Methratta and Link (2006) found that winter flounder caught in the NEFSC trawl surveys had higher mean biomass on fine rock (6 kg/tow) than on coarse rock and coarse sand (2-3 kg/tow) and very low biomass (<1 kg/tow) on fine sand and silt (Methratta and Link 2006). They are not known to rely on complex structures for shelter.

Yellowtail flounder are found in relatively shallow water, so there is juvenile and adult EFH designated throughout the three GB exemption areas, except for the northern triangle of CAII (Table 13). There is no overlap between yellowtail flounder EFH and the WGOM or CL exemption areas. Yellowtail flounder prefer sand and muddy sand, and avoid rocks, stony ground, and very soft mud (Klein-MacPhee 2002). In GOM-GB region, catch rates were highest on coarse sand, about three times higher than on coarse and fine rock, with very low catches on fine sand and silt (Methratta and Link 2006). Smaller fish were associated with larger grain size sediments (Methratta and Link 2007). Young of the year juveniles in the New York Bight settled in the available habitat (bare sand, shell hash, sand dollars) or associated with clean sand substrates, which often included peaks of sand wave crests (Sullivan et al. 2006).

<u>Target species that are underutilized:</u>

Haddock – both juvenile and adult haddock have designated EFH in all five exemption areas (Table 13). Haddock EFH designations are limited to areas shallower than 140 m and 160 m for juveniles and adults respectively, such that a relatively small proportion of the WGOM exemption area has haddock EFH.

Similarly, the deepest parts of the CL exemption area and the northern triangle of the CAII exemption area do not contain haddock EFH.

Haddock prefer gravel, pebbles, clay, broken shells, and smooth hard sand, particularly smooth areas between rocky patches (Klein-MacPhee 2002). These habitat types are common on Georges Bank, and less prevalent in the Gulf of Maine, which helps explain the increased abundance of haddock on Georges Bank (Brodziak 2005). In the southwestern Gulf of Maine, haddock catches were positively correlated with bottom reflectance (Auster et al. 2001). In the same area, Auster and Lindholm 2005 observed station-keeping adjacent to partially buried boulders as well as near boulders and cobbles with large globular sponges along the margins of deep boulder reefs. They considered haddock to be transient visitors to these reefs, and noted that bottom structure provides a refuge from flow.

Haddock do not frequent ledges, rocks, kelp, or soft oozy mud. Catch rates in the NEFSC bottom trawl survey are much higher in coarser substrates (coarse rock, fine rock, coarse sand (Methratta and Link 2006b). They are generally less selective for bottom type than cod, but feed on benthic prey more so than cod and are thus more closely associated with the seabed.

Like cod, young of the year haddock settle on a variety of sediment types on eastern Georges Bank, but by August they are found primarily on gravel pavement areas (Lough et al. 1989, Valentine and Lough 1991). Young of the year haddock do not inhabit shallow (<10 m) inshore areas in the GOM (Lazzari and Stone 2006).

Pollock tend to be found in deeper water, so while there is a high degree of overlap between pollock EFH and the two GOM exemption areas, there is little overlap with the GB exemption areas, except for the northern triangle of CAII (Table 13). Although YOY juveniles have been associated with rocky shallow water habitats containing macroalgae and eelgrass (Rangeley and Kramer 1995, 1998), pollock found further offshore are not strongly associated with any particular substrate type, at least according to the NEFSC trawl survey. Simlarly, Scott (1982) found that larger pollock on the Scotian shelf show little preference for bottom type. However, it should be noted that distribution and abundance information from the NEFSC bottom trawl survey is somewhat challenging to interpret because pollock is at times pelagic and schooling, which influences their catchability as compared to other fishes more closed associated with the bottom.

Acadian redfish tend to be found in deeper water, so while there is a h igh degree of overlap between redfish EFH and the two GOM exemption areas, there is little overlap with the GB exemption areas, except for the northern triangle of CAII (Table 13). Redfish are found primarily on mud habitats, often associated with living and non-living structures. Habitat association studies in the deep mud habitats near Stellwagen Bank found that juvenile redfish were one of the most numerous species observed on deep (50-100 m) boulder reefs (Auster and Lindholm 2005). The redfish appear to use these reefs for cover and for access to increased current flows above the reef, where drifting zooplankton prey can be consumed at higher rates. Early juveniles were found primarily on the reefs themselves, while late juveniles were found on both the reefs and among dense aggregations of cerianthid anemones (Auster et al. 2003). These life stages, ages up to 5-7 years, were considered year-round residents with small home ranges (Auster et al. 2003). Redfish have also been observed in association with hard bottom habitat and corals on 'bump' habitats in Western Jordan Basin.

Other species of interest:

Monkfish tend to be found in deeper water, so there is full EFH coverage for either adults or juveniles, and in most locations both lifestages, in the two GOM exemption areas (Table 13). Only the deeper waters in the NLCA exemption are designated. The CAI and CAII exemption areas have little overlap with monkfish EFH, with the exception of the northern triangle of CAII. In broad scale surveys of the Gulf of Maine/Georges Bank/Northern Mid-Atlantic Bight region, monkfish remain in deep water during both fall and spring, and are generally associated with fine-grained sediments, i.e. silt and clay (Methratta and Link 2006a). Pairwise comparisons showed monkfish biomass in kilograms per tow was lower in fine rock (granule-pebbles, 2-8 mm grain size) than in silt or clay. Results of more targeted bottom trawling in the southwestern Gulf of Maine on isolated mud bottom versus mud that is next to rocky bottom shows that monkfish were equally abundant (number/tow) in both habitats, but adult fish on edge of structured habitat had more to eat and were in better condition (Smith et al 2008). The northern portion of WGOM closed area was not found to be a good nursery area for juveniles: they were more abundant and had more to eat outside the closed area (Smith et al. 2008).

Barndoor skate EFH is very sparse in the GOM and there appears to be little overlap with the exemption areas (Table 13). A greater proportion of the GB exemption areas are designated. Barndoor skate have been found on both mud and sand/sand-gravel substrates, although sand is more common in the areas of high abundance over Georges Bank.

Little skate – there is no overlap between little skate EFH and the two exemption areas in the Gulf of Maine (Table 13). Most of the ten minute squares in the CAII, CAI, and NLCA exemption areas are designated little skate EFH. Little skate are generally found on sandy or gravelly bottoms, but also occur on mud (Bigelow and Schroeder 1953; McEachran and Musick 1975; Langton et al. 1995). In southern New England, at a depth of 55 m, little skate was associated with particular microhabitat features on the surface of the sediment during the day, including biogenic depressions and flat sand, but were randomly distributed at night (Auster et al. 1995). Skates are known to remain buried in depressions during the day and are more active at night (Michalopoulos 1990).

Smooth skate tend to be found in deeper water, so while there is a high degree of overlap between smooth skate EFH and the two GOM exemption areas, there is little overlap with the GB exemption areas, except for the northern triangle of CAII (Table 13). Smooth skates are most often found on soft mud substrate, but also occur on sand/shell/gravel/pebble substrates.

Thorny skate tend to be found in deeper water, so there is a high degree of overlap between thorny skate EFH and the two GOM exemption areas, but no overlap with the GB exemption areas (Table 13). Thorny skate appear to be more sparsely distributed in the southeastern GOM, and EFH is not designated in the northern triangle of CAII. They are found over various substrates including sand, gravel, broken shell, pebbles, to soft mud (Bigelow and Schroeder 1953; McEachran 2002). Scott (1982) found thorny skates on all substrates, with the highest catch rates on sand and gravel deeper than 100 m.

Winter skate are found in relatively shallow water, so there is juvenile and adult EFH designated throughout the three GB exemption areas, except for the northern triangle of CAII (Table 13). There is no overlap between winter skate EFH and the WGOM or CL exemption areas. Bigelow and Schroeder (1953) stated that this species is confined to sandy and gravelly bottoms but Tyler (1971) reported it from mud bottoms in Passamaquoddy Bay. In Long Island Sound during the spring, winter skate were most abundant on sand bottoms in the Mattituck Sill and Eastern Basin (Gottschall et al. 2000). On the Scotian Shelf, Scott (1982b) reports that the distribution of winter skate was confined to sand and gravel bottoms and Scott (1982b) suggests that bottom type, rather than depth, appears more important in determining the distributions of winter skate.

Table 13 - Habitat associations by species. In general, only positive associations are shown.

	Pelagic habitats	Benthic habitats					
Species	**Lifestage**	**Lifestage**	**Mud**	**Sand**	**Gravels and rock**	**Other**	**Notes**
Cod	Egg, larvae	Juveniles, adults	Can be found on mud	Prefer coarse sand, can be found on fine sand	Higher survey catch rates in fine and coarse rock; distinguish fine rock from other fine substrates. SW GOM: +relationship with high bottom reflectance; associated with gravel and deep boulder reefs; GB: prefer gravel pavements post settlement.	YOY juvenile preference for structured habitats that provide shelter	Overall preference for gravel habitats over sand
Winter flounder	Egg, larvae	Juveniles, adults	Low biomass on silt	Low biomass on fine sand, moderate biomass on coarse sand			Don't rely on complex structures for shelter
Yellowtail	Egg, larvae	Juveniles, adults	Prefer muddy sand, low catches on silt, avoid soft mud	Prefer sand, coarse sand, low catches on fine sand			
Haddock	Egg, larvae	Juveniles, adults	Prefer clay; do not typically use soft mud	Prefer smooth hard sand	Prefer gravel. SW GOM: +relationship with high bottom reflectance. GB: preference for gravel pavements post settlement.	Preference for broken shells, do not typically use kelp and other macroalgae	Do not frequent ledges, rocks. Less selective than cod for bottom type
Pollock	Egg, larvae, juveniles, adults	Juveniles, adults				YOY juveniles associated with kelp/other macroalgae	No particular substrate associations
Acadian redfish	Larvae	Juvenile, adult	Mud is primary habitat		Associated with boulder reefs		
Monkfish	Egg, larvae	Juvenile, adult	Associated with clay and silt		Found near boulder reefs		
Barndoor skate	None	Egg, juvenile, adult	Associated with mud	Associated with sand			
Little skate	None	Egg, juvenile, adult	Less commonly associated with mud	Associated with sand		Associated with depressions on open seabed	
Smooth skate	None	Egg, juvenile, adult	Most often associated with soft mud	Also associated with sand		Associated with broken shells	
Thorny skate	None	Egg, juvenile, adult	Associated with soft mud	Associated with sand		Associated with broken shells	

Species	Pelagic habitats	Benthic habitats					Notes
	Lifestage	Lifestage	Mud	Sand	Gravels and rock	Other	
Winter skate	None	Egg, juvenile, adult	Less commonly associated with mud	Associated with sand			

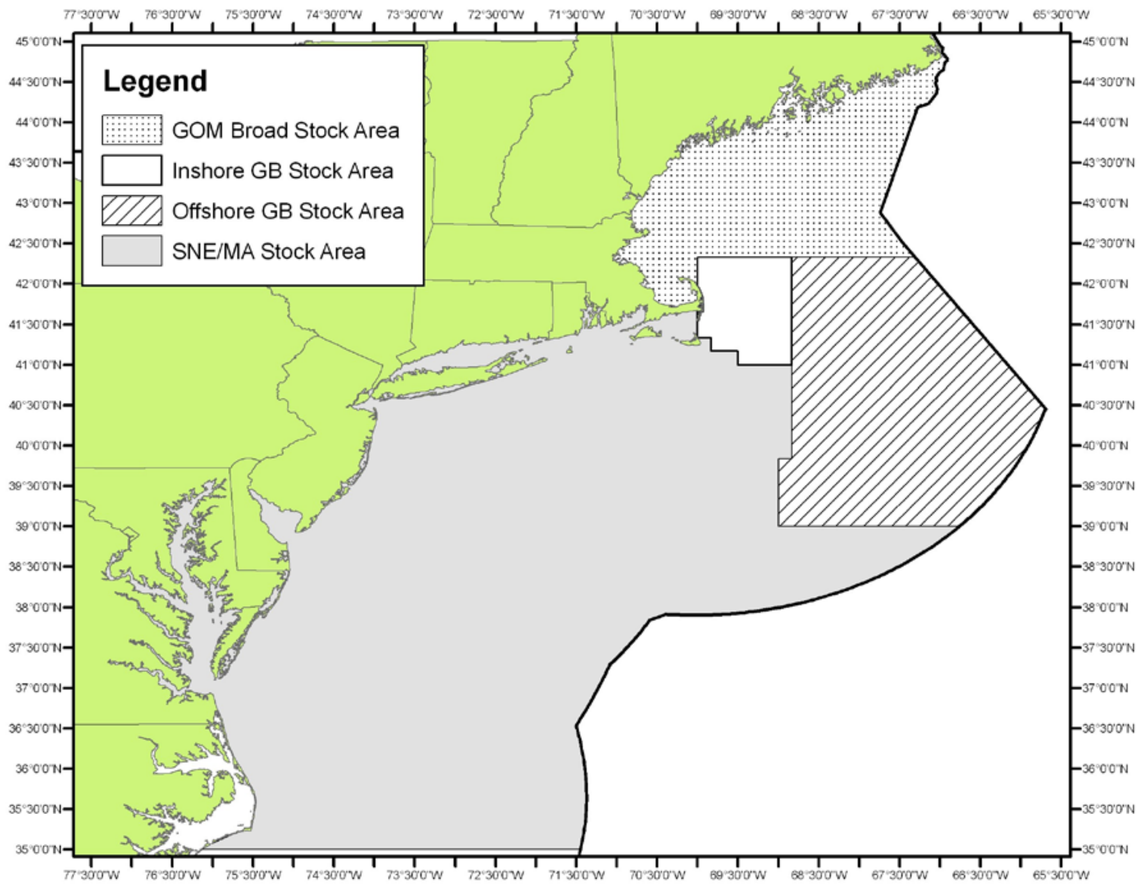
6.2 Groundfish Species

This section describes the life history and stock population status for each allocated fish stock the sectors harvest under the Northeast Multispecies FMP. Figure 16 identifies the four broad stock areas used in the fishery. Please refer to the species habitat associations described in Section 4.2 for information on the interactions between gear and species. Section 6.1 also provides a comparison of depth-related demersal fish assemblages of Georges Bank and the Gulf of Maine. This section concludes with an analysis of the interaction between the gear types the sectors intend to use (as described in Section 6.1.6.1) and allocated target species. The following discussions have been adapted from the GARM III report (NEFSC 2008) and the EFH Source Documents: Life History and Habitat Characteristics are assessable via the NEFSC website at http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

6.2.1 Species and Stock Status Descriptions

The allocated target stocks for the sectors are GOM Cod, GB Cod, GOM Haddock, GB Haddock, American Plaice, Witch 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 16 - Broad stock areas as defined in Amendment 16



Spiny dogfish, skates, and monkfish are considered in this EA as "non-allocated target species and bycatch" in Sections 4.4 and 5.1. Northeast Multispecies FMP does no allocate these species. They and are managed under their own FMPs.

The Northeast Multispecies FMP also manages Atlantic halibut, ocean pout, windowpane flounder, and SNE/MA winter flounder. However, sectors do not receive an allocation of these species. Sector and common pool vessels cannot land wolffish, ocean pout, windowpane flounder, and inshore GB and SNE/MA winter flounder, but can retain one halibut per trip. Wolffish are provisionally managed under the Northeast Multispecies FMP Amendment 16 to the Northeast Multispecies FMP (NEFMC 2009a) addresses these species. These species are discussed in Section 6.3.

6.2.1.1 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 and Georges Bank. GOM cod attain sexual maturity at a later age than GB cod due to differences in growth rates between the two stocks. The greatest concentrations of cod off the Northeast coast of the U.S. are on rough bottoms in waters between 33 and 492 ft (10 and 150 m) and at temperatures between 32 and 50°F (0 and 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 and 7°C). It is delayed until spring when winters are severe and peaks in winter when mild. Eggs are pelagic, buoyant, spherical, and transparent. They drift for 2 to 3 weeks before hatching. The larvae are pelagic for about three months until reaching 1.6 to 2.3 in (4 to 6 cm), at which point they descend to the seafloor. Most remain on the bottom after this descent, 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.

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 has increased since the late 1990's from 12,236 ton (11,100 metric tons [mt]) in 1997 to 37,479 ton (34,000 mt) in 2007. However, the stock remains low relative to historic levels and is subject to a formal stock rebuilding plan. The 2010 biomass estimate, the most recent estimate available, was 8 percent of the biomass rebuilding target. Currenly, the GOM cod stock is overfished and overfishing is occurring.

6.2.1.2 Georges Bank Cod

Life History: The GB cod stock, *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 and 150 m) and at temperatures between 32 and 50° F (0 and 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 and 7°C). It is delayed until spring when winters are severe and peaks in winter when 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 to 6 cm), at which point they descend to the seafloor. Most remain on the bottom after this descent, 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.

Population Status: GB cod are a transboundary stock harvested by both the U.S. and Canadian fishing fleets. The GB cod stock is overfished and overfishing is occurring.

6.2.1.3 Gulf of Maine Haddock

Life History: The GOM haddock, *Melanogrammus aeglefinus*, is a commercially-exploited groundfish found in the North Atlantic Ocean. This demersal gadoid species occurs from Cape May, New Jersey to the Strait of Belle Isle, Newfoundland in the western North Atlantic. A total of six distinct haddock stocks have been identified. Two of these haddock stocks occur in U.S. waters associated with Georges Bank and the Gulf of Maine.

Haddock are highly fecund broadcast spawners. They spawn over various substrates including rocks, gravel, smooth sand, and mud. Haddock release their eggs near the ocean bottom in batches where a courting male then fertilizes them. After fertilization, haddock eggs become buoyant and rise to the surface water layer. In the Gulf of Maine, spawning occurs from early February to May, usually peaking in February to April. Jeffreys Ledge and Stellwagen Bank are the two primary spawning sites in the Gulf of Maine. Fertilized eggs are buoyant and remain in the water column where subsequent development occurs. Larvae metamorphose into juveniles in roughly 30 to 42 days at lengths of 0.8 to 1.1 in (2 to 3 cm). Small juveniles initially live and feed in the epipelagic zone. Juveniles remain in the upper part of the water column for 3 to 5 months. Juveniles visit the ocean bottom in search of food. Juveniles settle into a demersal existence once they locate suitable bottom habitat. Haddock do not make extensive seasonal migrations. Haddock prefer deeper waters in the winter and tend to move shoreward in summer.

Population Status: The GOM haddock stock is not overfished but overfishing is occurring. The stock size has been decreasing and is approaching an overfished condition. Should the stock size drop below the minimum stock size threshold, a formal stock rebuilding program would need to be put in place.

6.2.1.4 Georges Bank Haddock

Life History: The general life history of GB haddock, *Melanogrammus aeglefinus,* is comparable to the GOM haddock as described above. On Georges Bank, spawning occurs from January to June, usually peaking from February to early-April. Georges Bank is the principal haddock spawning area in the Northeast U.S. Shelf Ecosystem. GB haddock spawning concentrates on the northeast peak of Georges Bank.

Median age and size of maturity differ slightly between the GB and GOM haddock stocks. GARM III found that the GOM fishery does not target haddock. The fleet targets mostly flatfish using large square (6.5 inch [16.5 cm]) mesh gear. This leads to reduced selectivity on haddock. The GOM haddock have lower weights at age than the GB stock and the age at 50 percent maturity was also lower for GOM haddock than GB haddock.

Population Status: The GB haddock stock is a transboundary resource co-managed with Canada. 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. The stock is not overfished and overfishing is not occurring. The fishing mortality rate for this stock has been low in recent years.

6.2.1.5 American Plaice

Life History: The American plaice, *Hippoglossoides platessoides*, is an arctic-boreal to temperate-marine pleuronectid (righteye) flounder that inhabits both sides of the North Atlantic on the continental shelves of northeastern North America and northern Europe. Off the U.S. coast, American plaice are managed as a single stock in the Gulf of Maine-Georges Bank region. American plaice are batch spawners. They release 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 will drift into the upper water column after release. Eggs hatch at the surface and the amount of time between fertilization and hatching varies with the water temperature. Transformation of the larvae and migration of the left eye begins when the larvae are approximately 0.8 in (20 millimeters (mm)). Dramatic physiological transformations occur during the juvenile stage. The body shape continues to change, flattening and increasing in depth from side to side. 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, American plaice is a sedentary species migrating only for spawning and feeding.

Population Status: In the Gulf of Maine and Georges Bank area, the American plaice stock is not overfished and overfishing is not occurring. However, a stock assessment conducted in 2012 indicates that the stock will not rebuild by 2014, the currently specified rebuilding target date, even if no fishing is allowed on the stock in FY 2013. Because of this inadequate rebuilding progress, a revised rebuilding program is necessary and will be developed for use no later than May 1, 2014.

6.2.1.6 Witch Flounder

Life History: The 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. NMFS manages witch flounder 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 to 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 and 50 °F (0 to 10^{o}C).

Population Status: Witch flounder are overfished and overfishing is occurring.

6.2.1.7 Gulf of Maine Winter Flounder

Life History: The 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. NMFS manages and assesses winter flounder 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. Winter flounder spawn from winter through spring, with peak spawning occurring 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 (15^{o}C) although some remain inshore year-round. The eggs of winter flounder are demersal, adhesive, and stick together in clusters. Larvae are initially planktonic but become increasingly bottom-oriented as metamorphosis approaches. Metamorphosis is when the left eye migrates to the right side of the body and the larvae become “flounder-like”. It begins around 5 to 6 weeks after hatching, and finishes by the time the larvae are 0.3 to 0.4 in (8 to 9 mm) in length at about 8 weeks after hatching. Newly metamorphosed young-of-the-year winter flounder reside in shallow water where individuals may grow to about 4 in (100 mm) within the first year.

Population Status: The exact status determination for GOM winter flounder is unknown. Overfishing is not occurring.

6.2.1.8 Georges Bank Winter Flounder

Life History: The life history of the GB winter flounder**,** *Psuedopleuronectes americanus*, is comparable to the GOM winter flounder life history described above.

Population Status: The stock is not overfished and not undergoing overfishing.

6.2.1.9 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: The Cape Cod/GOM yellowtail flounder stock continues to be overfished and overfishing is continuing. However, fishing mortality has been declining since 2004 and was at the lowest level observed in the time series in 2009. Spawning stock biomass has increased the past few years.

6.2.1.10 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 above. The median age at maturity for females is 1.8 years on Georges Bank. Spawning takes place along continental shelf waters of Georges Bank.

Population Status: GB yellowtail flounder is overfished, but overfishing is not occurring.

6.2.1.11 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 above. The median age at maturity for females is 1.6 years off southern New England.

Population Status: Based on a 2012 assessment, the SNE/MA yellowtail flounder stock is not overfished, not subject to overfishing, and is rebuilt. The assessment concluded that the stock is less productive than previously believed and, as a result, the overall biomass at recently seen low levels represents the rebuilt state of nature for the stock.

6.2.1.12 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. Nothing is known about redfish breeding behavior. However, redfish fertilization is internal and fecundity is relatively low.

Population Status: The redfish stock is not overfished and overfishing is not occurring.

6.2.1.13 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^{o}C) and peaks when temperatures are approximately 40 to 43 °F (4.5 to 6^{o}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. Age and size at maturity of pollock have declined in recent years. This similar trend has also been reported in other marine fish species such as haddock and witch flounder.

Population Status: The pollock stock is not subject to overfishing, is not overfished, and was declared rebuilt in 2010.

6.2.1.14 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 to 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.

Population Status: The 2008 assessment for white hake concluded the stock was overfished and overfishing was occurring. A new comprehensive stock assessment is planned for early 2013.

6.2.1.15 SNE/MA Winter Flounder

Life History: The winter flounder, blackback, or lemon sole, Psuedopleuronectes americanus, is a demersal flatfish distributed in the western North Atlantic from Labrador to Georgia. Winter flounder prefer mud, sand, clay, and even gravel habitat, but offshore populations may occur on hard bottom (Collette and Klein-MacPhee 2002). They migrate inshore in the fall and early winter and spawn in late winter and early spring (Pereira et al. 1999), with peak spawning occurring in Massachusetts Bay and south of Cape Cod during February and March, continuing into May. After spawning, adults typically leave inshore areas when water temperatures exceed 59 °F (15^{o}C) although some remain inshore year-round. The eggs of winter flounder are demersal, adhesive, and stick together in clusters. Larvae are initially planktonic but become increasingly bottom-oriented as metamorphosis approaches. Metamorphosis is when the left eye migrates to the right side of the body and the larvae become "flounder-like". It begins around 5 to 6 weeks after hatching, and finishes by the time the larvae are 0.3 to 0.4 in (8 to 9 mm) in length at about 8 weeks after hatching. Newly metamorphosed young-of-the-year winter flounder reside in shallow water where individuals may grow to about 4 in (100 mm) within the first year (Collette and Klein-MacPhee 2002). In U.S. waters, the resource is assessed and managed as three stocks: Gulf of Maine, Southern New England/Mid-Atlantic (SNE/MA), and Georges Bank.

Population Status: A benchmark assessment completed for SNE/MA winter flounder in 2011 conncluded that this stock was overfished but overfishing was not occurring in 2010 (NEFSC 2011).

6.2.1.16 GOM/GB Windowpane 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 and Klein-MacPhee 2002). Windowpane prefer sandy bottom habitats. They 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 between 32º-80ºF (0º-26.8ºC) (Moore 1947). On Georges Bank, the species is most abundant at depths < 60 m during late spring through autumn but overwintering occurs in deeper waters out to 366 m (Chang et al. 1999). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB) and Southern New England-Mid-Atlantic Bight (SNE/MA) 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 and 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 and Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (G. Klein-MacPhee, unpubl. data, as cited in Collette and 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 windowpane settle inshore and then move offshore to deeper waters as they grow. Trawl survey data suggest that windowpane on Georges Bank aggregate in shallow water during summer and early fall and move offshore in the winter and early spring (Grosslein and Azarovitz 1982).

Population Status: Indices from NEFSC fall surveys are used as an indicator of stock abundance and biomass. These biomass indices have fluctuated above and below the time series median as fishing mortality rates have fluctuated below and above the point where the stock could replenish itself. Biomass indices increased to levels at or slightly above the median during 1998-2003, but then fell below the median from 2004-2010 and was 29% of B_{MSY} in 2010 (NEFSC 2012). According to a 2012 assessment update, the stock was overfished and overfishing was occurring in 2010.

6.2.1.17 SNE/MAB Windowpane Flounder

Life History: Windowpane flounder, *Scophthalmus aquosus*, is a left-eyed, flatfish species that occurs in the northwest Atlantic from the Gulf of St. Lawrence to Florida, with the greatest abundance on Georges

Bank and in the New York Bight (Collette and Klein-MacPhee 2002). Windowpane prefer sandy bottom habitats at depths < 180 ft (55 m), but they occur at depths from the high water mark to 656 ft (200 m) and at temperatures between 32º-80ºF (0º-26.8ºC) (Moore 1947). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB) and Southern New England-Mid-Atlantic Bight (SNE/MA) 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 and Azarovitz 1982). 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 and Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (G. Klein-MacPhee, unpubl. data, as cited in Collette and Klein-MacPhee 2002). During the first year, spring-spawned fish have significantly faster growth rates than autumn-spawned fish, which may lead to different natural mortality rates (Neuman et al. 2001).

Population Status: A 2012 assessment update indicated that in 2010 biomass was well above the B_{MSY} proxy (146%) and overfishing was not occurring (NEFSC 2012). As a result this stock has been declared rebuilt.

6.2.1.18 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 sand and gravel bottom (Orach-Meza 1975) at an average depth of 49-262 ft (15-80 m) (Clark and Livingstone 1982) and temperatures of 43º-48º F (6º-9º C) (Scott 1982). In U.S. 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 was 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 was 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 and 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 and Crim 1995a) and females lay egg masses in 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 and Brown 1991; Yao and Crim 1995a).

Population Status: Between 1975 and 1985, NEFSC spring trawl survey biomass indices increased to record high levels, peaking in 1981and 1985. Since 1985, survey catch per tow indices have generally declined, and the 2010 index was the lowest value in the time series. Catch and exploitation rates have also been low, but stock size has not increased. A 2012 assessment update determined that in 2010 ocean pout was overfished, but overfishing was not occurring (NEFSC 2012).

6.2.1.19 Atlantic Halibut

Life History: Atlantic halibut, *Hippoglossus hippoglossus*, is the largest species of flatfish found in the northwest Atlantic Ocean. This long-lived, late-maturing flatfish is distributed from Labrador to southern New England (Collette and Klein-MacPhee 2002). They prefer sand, gravel, or clay substrates at depths up to 1000 m (Scott and Scott 1988; Miller et al. 1991). Along the coastal Gulf of Maine, halibut move to deeper water in winter and shallower water in summer (Collette and 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 and Gulliksen 1988). Spawning is believed to occur in waters of the upper continental slope at depths of 200 m or greater (Scott and Scott 1988). Halibut eggs are buoyant but drift suspended in the water at depths of 54-90 m (Tåning 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: Survey indices are highly variable because the NEFSC trawl surveys catch low numbers of halibut. The spring survey abundance index suggested a relative increase during the late 1970s to the early 1980s, a decline during the 1990s, and an increase since the late 1990s. Based on the results of a 2012 assessment update, Atlantic halibut is overfished and overfishing is not occurring (NEFSC 2012).

6.2.1.20 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 and 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 to 240 m) (Nelson and Ross 1992) and at temperatures of 29.7º-50.4º F (-1.3º-10.2º C) (Collette and Klein-MacPhee 2002). They prefer complex benthic habitats with large stones and rocks (Pavlov and 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 and Ross 1992). Most individuals mature by age 5-6 when they reach approximately 18.5 in (47 cm) total length (Nelson and Ross 1992, Templeman 1986). However, size at first maturity varies regionally; northern fish mature at smaller sizes than faster growing southern fish. There is conflicting information about the spawning season for Atlantic wolffish in the Gulf of Maine-Georges Bank region. Peak spawning period is believed to occur from September to October (Collette and Klein-MacPhee 2002), though laboratory studies have shown that wolffish can spawn most of the year (Pavlov and Moksness 1994). Eggs are laid in masses and that the males are thought to brood for several months. Incubation time is dependent on water temperature and may be 3 to 9 months. Larvae and early juveniles are pelagic between 20 and 40 mm TL, with settlement beginning by 50 mm TL (Falk-Petersen and Hansen 1990).

Population Status: NEFSC spring and fall bottom trawl survey indices show abundance and biomass of Atlantic wolffish generally has declined over the last two to three decades. However, Atlantic wolffish are encountered infrequently on NEFSC bottom trawl surveys and there is uncertainty as to whether the NEFSC surveys adequately sample this species (NDPSWG, 2009). Atlantic wolffish continues to be considered a data poor species. An assessment update in 2012 determined that the stock is overfished, but overfishing is not occurring.

6.2.2 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 14 (adapted from Amendment 16) 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 14 vary slightly between the two studies. For further information on fish habitat relationships, see Table 10.

Table 14 - Comparison of Demersal Fish Assemblages of Georges Bank and the Gulf of Maine

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

6.2.3 Stock Status Trends

The most recent stock assessments for the 19 groundfish stocks can be found via the NEFSC website at http://www.nefsc.noaa.gov/saw/. The information in this section is adapted from the most recent stock assessment report for the groundfish stocks. The information in this section is adapted from the most recent stock assessment report for the groundfish stocks. Table 15 summarizes the status of the northeast groundfish stocks.

Table 15 - Status of the Northeast Groundfish Stocks for fishing year 2013

Stock Status	Stock (assessment source)
Overfished and Overfishing Biomass < ½ B_{MSY} and F > F_{MSY}	GB Cod (GARM III) GOM Cod (SARC 54) Cape Cod/GOM Yellowtail Flounder (assessment update) White Hake (GARM III,) Witch Flounder (assessment update) Northern Windowpane (operational assessment) GB Yellowtail Flounder (2012 TRAC)
Overfished but not Overfishing Biomass < ½ B_{MSY} and F $\leq$ F_{MSY}	Ocean Pout (assessment update) Atlantic Halibut (assessment update) GOM Winter Flounder (SARC 52)[b] Atlantic wolffish (assessment update) SNE/MA Winter Flounder
Not Overfished but Overfishing Biomass $\geq$ ½ B_{MSY} and F > F_{MSY}	GOM Haddock (assessment update)
Not Overfished and not Overfishing Biomass $\geq$ ½ B_{MSY} and F $\leq$ F_{MSY}	Pollock (SARC 50) Acadian Redfish (assessment update) SNE/MA yellowtail flounder (SARC 54) American Plaice (assessment update) GB Haddock (assessment update) GB Winter Flounder(SARC 52) Southern Windowpane (assessment update)

Notes:

B_{MSY} = biomass necessary to produce maximum sustainable yield (MSY)

F_{MSY} = fishing mortality rate that produces the MSY

[b] Rebuilding, but no defined rebuilding program due to a lack of data. Unknown whether the stock is overfished.

Assessment references (available at http://www.nefsc.noaa.gov/saw/)

Northeast Fisheries Science Center. 2008. Assessment of 19 Northeast Groundfish Stocks through 2007: Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008. US Dep Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 08-15; 884 p + xvii.

Northeast Fisheries Science Center. 2010. 50th Northeast Regional Stock Assessment Workshop (50th SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 10-17; 844 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026

Northeast Fisheries Science Center. 2011. 52nd Northeast Regional Stock Assessment Workshop (52nd SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 11-17; 962 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026

Northeast Fisheries Science Center. 2012. 53rd Northeast Regional Stock Assessment Workshop (53rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-03; 33 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026

Northeast Fisheries Science Center. 2012. 54th Northeast Regional Stock Assessment Workshop (54th SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-14; 40 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026,

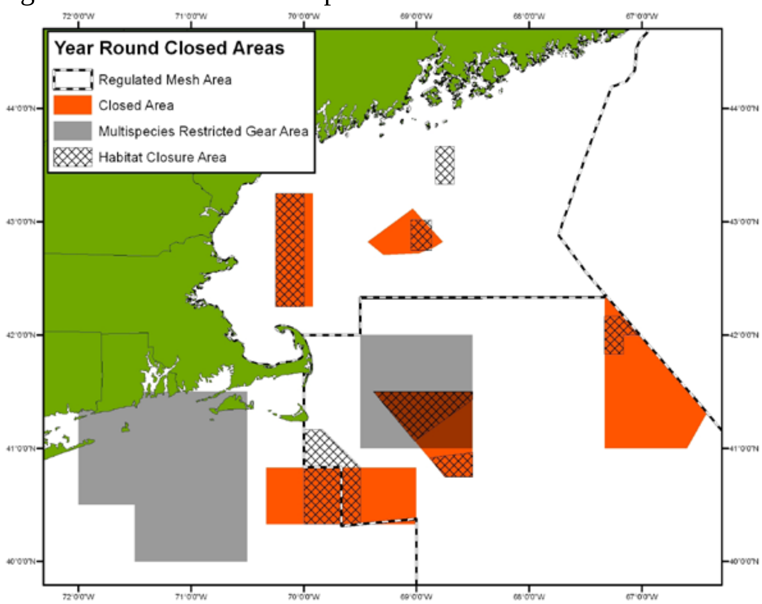
Northeast Fisheries Science Center. 2012. Assessment or Data Updates of 13 Northeast Groundfish Stocks through 2010. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-06; 789 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026

6.2.4 Areas Closed to Fishing

Select areas are closed to some level of fishing to protect the sustainability of fishery resources. Long-term closures result in the removal or reduction of fishing effort from important fishing grounds. Therefore, fishery related mortalities to stocks utilizing the closed areas should decrease. Figure 17 shows the Closed Areas for FY 2012.

Amendment 13 to the Northeast Multispecies FMP and Amendment 10 of the Atlantic Sea Scallop FMP established year-round habitat closed areas which are off-limits to all mobile, bottom-tending gear like trawls and dredges. These closures were designed to minimize the adverse effects of fishing on EFH for species managed by the NEFMC (Table 10). In many cases, these closed areas overlap portions of the groundfish mortality closures (see Figure 17). However, in other cases (Jeffreys Bank in the Gulf of Maine and the area southeast of Nantucket Island) they do not. NEFMC Omnibus EFH Amendment 2 is currently evaluating the closed habitat areas. Therefore, these areas may be changed or eliminated in the future. FW 48 proposes allowing sectors to request exemptions to the closed areas; the measure is discussed in Section 6.6. In addition, portions of four submarine canyons on the outer continental shelf are closed to all bottom trawling in order to protect vulnerable habitats for tilefish. Detailed descriptions and maps of these areas are available in Amendment 1 to the MAFMC Tilefish FMP.

Figure 17- Northeast Multispecies Closed Areas and U.S/Canada



6.2.5 Interaction between Gear and Allocated Target Species

FY 2010 through FY 2011 data show that the majority of fish of all species caught on groundfish trips are caught with trawls. GARM III indicated that only cod and white hake are caught in significant numbers by gillnets. Only haddock are caught in significant numbers by hook and line.

6.3 Non-Allocated Target Species and Bycatch

Non-allocated target species are species which sector vessels are not assigned an ACE but can target and land. Bycatch refers to fish which are harvested in a fishery, but are discarded and not sold or kept for personal use. Non-allocated target species and bycatch may include a broad range of species. For purposes of this assessment the non-allocated target species and bycatch most likely to be affected by the sector operations plans include spiny dogfish, skates, and monkfish. This approach follows the convention established in Amendment 16. Spiny dogfish, skates, and monkfish were the top three non-groundfish species landed by multispecies vessels in FY 2006 and FY 2007 under the Category B (regular) DAS program (Amendment 16, Table 87). American lobster is also included as a non-target bycatch species for FY 2012 because many sector vessels also fish in the lobster fishery. These species have no allocation under the Northeast Multispecies FMP and are managed under separate FMPs. Fishermen commonly land monkfish and skates. Spiny dogfish tend to be relatively abundant in catches. Fishermen may land some spiny dogfish, but dogfish are often the predominant component of the discarded bycatch. Fishermen may discard monkfish when regulations or market conditions constrain the amount of the catch that they can land.

Atlantic halibut, Gulf of Maine-Georges Bank windowpane flounder, Southern New England-Mid-Atlantic Bight windowpane flounder, ocean pout, Atlantic wolffish, and Southern New England/Mid-Atlantic (SNE/MA) winter flounder are part of the Multispecies FMP, but are not allocated to sectors. Therefore, impacts to these species are assessed under this VEC as bycatch.

6.3.1 Spiny Dogfish

Life History: The spiny dogfish, Squalus acanthias, occurs in the western North Atlantic from Labrador to Florida. Regulators consider spiny dogfish 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 about 18 to 22 months, and produce between 2 to 15 pups with an average of 6. Size at maturity for females is around 31 in (80 cm), but can vary from 31 to 33 in (78 cm to 85 cm) depending on the abundance of females.

Population Management and Status: The NEFMC and MAFMC jointly develop the spiny dogfish FMP for federal waters. The Atlantic States Marine Fisheries Commission (ASMFC) concurrently develops a plan for state waters. 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. Based upon the 2009 updated stock assessment performed by the Northeast Fisheries Science Center, the spiny dogfish stock is not presently overfished and overfishing is not occurring. NMFS declared the spiny dogfish stock rebuilt for the purposes of U.S. management in May 2010.

6.3.2 Skates

Life History: The seven species in the Northeast Region skate complex are: 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*). The 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 the little and winter skates in the Northeast Region. . The thorny and smooth skates typically occur in the Gulf of Maine. The 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. Skates tend to move seasonally in response to changes in water temperature. Therefore, 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 to 12 months, with the young having the adult form at the time of hatching.

Population Management and Status: NMFS implemented the Northeast Skate Complex Fishery Management Plan (Skate FMP) in September 2003. The FMP required by both dealers and vessels to report skate landings by species (http://www.nefmc.org/skates/fmp/fmp.htm). 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. Amendment 3 also reduced possession limits, in-season possession limit triggers, and 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 2011/spring 2012 one skate species was overfished (thorny) and overfishing was not occurring in any of the seven skate species.

Skate landings have generally increased since 2000. 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*, also called 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. These migrations may relate to spawning or possibly to food availability.

Female monkfish begin to mature at age 4 with 50 percent of females maturing by age 5 (about 17 in [43 cm]). Males generally mature at slightly younger ages and smaller sizes (50 percent 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 about 1 to 3 weeks, depending on water temperature. The larvae and juveniles spend several months in a pelagic phase before settling to a benthic existence at a size of about 3 in (8 cm).

Population Management and Status: NMFS implemented the Monkfish FMP in 1999 (NEFMC and MAFMC 1998). 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. Monkfish in both management regions are not overfished and overfishing is not occurring.

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.).

Population Management and Status: The FMP was developed by the Mid-Atlantic Fishery Management Council in 1988. 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.

The stock is not overfished and overfishing is not occurring, although the stock is still rebuilding (NEFSC 2008).

6.3.5 American lobster

Life History: The American lobster, *Homarus americanus*, occurs in continental shelf waters from Maine to North Carolina. 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 external skeleton that is periodically cast off (molted) to allow growth and mating to take place. Eggs are carried under the female’s abdomen during the 9 to 12 month incubation period. Larger lobsters produce eggs with greater energy content and thus, may produce larvae with higher survival rates (Attard and Hudon, 1987). Seasonal timing of egg extrusion and larval hatching is somewhat variable among areas and may also vary due to seasonal weather patterns. Overall, 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. They will molt more than 20 times over a period of 5 to 8 years before they reach the minimum legal size to be harvested. Cooper and Uzmann, (1971) and Uzmann, et al., (1977) observed that tagged lobster were observed to move to relatively cool deep canyon areas in late fall and winter, and then migrate back to shallower and relatively warm water in spring and summer

Population Management and Status: The states and NMFS cooperatively manage the American lobster resource and fishery under the framework of the Atlantic States Marine Fisheries Commission (ASMFC). States have jurisdiction for implementing measures in state waters, while NMFS implements complementary regulations in federal waters. Inshore landings have increased steadily since the early 1970s. 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 (within 3 miles of shore). The most recent peer-reviewed stock assessment for American lobster, published by the ASMFC in 2009, identifies the status of the three biological stock units, delineated primarily on the basis of regional differences in life history parameters, such as lobster distribution and abundance, patterns of migration, location of spawners, and the dispersal and transport of larvae. These stock units are the Gulf of Maine, Georges Bank, and Southern New England. While each 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).

6.3.6 Gulf of Maine-Georges Bank Windowpane 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 and Klein-

MacPhee 2002). Windowpane prefer sandy bottom habitats. They 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 between 32º-80ºF (0º-26.8ºC) (Moore 1947). On Georges Bank, the species is most abundant at depths < 60 m during late spring through autumn but overwintering occurs in deeper waters out to 366 m (Chang et al. 1999). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB) and Southern New England-Mid-Atlantic Bight (SNE/MA) 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 and 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 and Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (G. Klein-MacPhee, unpubl. data, as cited in Collette and 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 windowpane settle inshore and then move offshore to deeper waters as they grow. Trawl survey data suggest that windowpane on Georges Bank aggregate in shallow water during summer and early fall and move offshore in the winter and early spring (Grosslein and Azarovitz 1982).

Population Status: Indices from NEFSC fall surveys are used as an indicator of stock abundance and biomass. These biomass indices have fluctuated above and below the time series median as fishing mortality rates have fluctuated below and above the point where the stock could replenish itself. Biomass indices increased to levels at or slightly above the median during 1998-2003, but then fell below the median from 2004-2010 and was 29% of B_{MSY} in 2010 (NEFSC 2012). According to a 2012 assessment update, the stock was overfished and overfishing was occurring in 2010.

6.3.7 Southern New England-Mid-Atlantic Bight Windowpane Flounder

Life History: Windowpane flounder, *Scophthalmus aquosus*, is a left-eyed, flatfish species that occurs in the northwest Atlantic from the Gulf of St. Lawrence to Florida, with the greatest abundance on Georges Bank and in the New York Bight (Collettee and Klein-MacPhee 2002). Windowpane prefer sandy bottom habitats at depths < 180 ft (55 m), but they occur at depths from the high water mark to 656 ft (200 m) and at temperatures between 32º-80ºF (0º-26.8ºC) (Moore 1947). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB) and Southern New England-Mid-Atlantic Bight (SNE/MA) 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 and Azarovitz 1982). 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 and Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (G. Klein-MacPhee, unpubl. data, as cited in Collette and Klein-MacPhee 2002). During the first year, spring-spawned fish have significantly faster growth rates than autumn-spawned fish, which may lead to different natural mortality rates (Neuman et al. 2001).

Population Status: A 2012 assessment update indicated that in 2010 biomass was well above the B_{MSY} proxy (146%) and overfishing was not occurring (NEFSC 2012). As a result this stock has been declared rebuilt.

6.3.8 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 sand and gravel bottom (Orach-Meza 1975) at an average depth of 49-262 ft (15-80 m) (Clark and Livingstone 1982) and temperatures of 43º-48º F (6º-9º C) (Scott 1982). In U.S. 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 was 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 was 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 and 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 and Crim 1995a) and females lay egg masses in 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 and Brown 1991; Yao and Crim 1995a).

Population Status: Between 1975 and 1985, NEFSC spring trawl survey biomass indices increased to record high levels, peaking in 1981and 1985. Since 1985, survey catch per tow indices have generally declined, and the 2010 index was the lowest value in the time series. Catch and exploitation rates have also been low, but stock size has not increased. A 2012 assessment update determined that in 2010 ocean pout was overfished, but overfishing was not occurring (NEFSC 2012).

6.3.9 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 and 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 to 240 m) (Nelson and Ross 1992) and at temperatures of 29.7º-50.4º F (-1.3º-10.2º C) (Collette and Klein-MacPhee 2002). They prefer complex benthic habitats with large stones and rocks (Pavlov and 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 and Ross 1992). Most individuals mature by age 5-6 when they reach approximately 18.5 in (47 cm) total length (Nelson and Ross 1992, Templeman 1986). However, size at first maturity varies regionally; northern fish mature at smaller sizes than faster growing southern fish. There is conflicting information about the spawning season for Atlantic wolffish in the Gulf of Maine-Georges Bank region. Peak spawning period is believed to occur from September to October (Collette and Klein-MacPhee 2002), though laboratory studies have shown that wolffish can spawn most of the year (Pavlov and Moksness 1994). Eggs are laid in masses and that the males are thought to brood for several months. Incubation time is dependent on water temperature and may be 3 to 9 months. Larvae and early juveniles are pelagic between 20 and 40 mm TL, with settlement beginning by 50 mm TL (Falk-Petersen and Hansen 1990).

Population Status: NEFSC spring and fall bottom trawl survey indices show abundance and biomass of Atlantic wolffish generally has declined over the last two to three decades. However, Atlantic wolffish are encountered infrequently on NEFSC bottom trawl surveys and there is uncertainty as to whether the NEFSC surveys adequately sample this species (NDPSWG, 2009). Atlantic wolffish continues to be considered a data poor species. An assessment update in 2012 determined that the stock is overfished, but overfishing is not occurring.

6.3.10 Atlantic Halibut

Life History: Atlantic halibut, *Hippoglossus hippoglossus*, is the largest species of flatfish found in the northwest Atlantic Ocean. This long-lived, late-maturing flatfish is distributed from Labrador to southern New England (Collette and Klein-MacPhee 2002). They prefer sand, gravel, or clay substrates at depths up to 1000 m (Scott and Scott 1988; Miller et al. 1991). Along the coastal Gulf of Maine, halibut move to deeper water in winter and shallower water in summer (Collette and 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 and Gulliksen 1988). Spawning is believed to occur in waters of the upper continental slope at depths of 200 m or greater (Scott and Scott 1988). Halibut eggs are buoyant but drift suspended in the water at depths of 54-90 m (Tåning 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: Survey indices are highly variable because the NEFSC trawl surveys catch low numbers of halibut. The spring survey abundance index suggested a relative increase during the late 1970s to the early 1980s, a decline during the 1990s, and an increase since the late 1990s. Based on the results of a 2012 assessment update, Atlantic halibut is overfished and overfishing is not occurring (NEFSC 2012).

6.3.11 Southern New England-Mid-Atlantic Winter Flounder

Life History: The winter flounder, blackback, or lemon sole, Psuedopleuronectes americanus, is a demersal flatfish distributed in the western North Atlantic from Labrador to Georgia. Winter flounder prefer mud, sand, clay, and even gravel habitat, but offshore populations may occur on hard bottom (Collette and Klein-MacPhee 2002). They migrate inshore in the fall and early winter and spawn in late winter and early spring (Pereira et al. 1999), with peak spawning occurring in Massachusetts Bay and south of Cape Cod during February and March, continuing into May. After spawning, adults typically leave inshore areas when water temperatures exceed 59 °F (15^{o}C) although some remain inshore year-round. The eggs of winter flounder are demersal, adhesive, and stick together in clusters. Larvae are initially planktonic but become increasingly bottom-oriented as metamorphosis approaches. Metamorphosis is when the left eye migrates to the right side of the body and the larvae become "flounder-like". It begins around 5 to 6 weeks after hatching, and finishes by the time the larvae are 0.3 to 0.4 in (8 to 9 mm) in length at about 8 weeks after hatching. Newly metamorphosed young-of-the-year winter flounder reside in shallow water where individuals may grow to about 4 in (100 mm) within the first year (Collette and Klein-MacPhee 2002). In U.S. waters, the resource is assessed and managed as three stocks: Gulf of Maine, Southern New England/Mid-Atlantic (SNE/MA), and Georges Bank.

Population Status: A benchmark assessment completed for SNE/MA winter flounder in 2011 concluded that this stock was overfished but overfishing was not occurring in 2010 (NEFSC 2011).

6.3.12 Whiting (Silver Hake)

This description is quoted from the NEFSC Status of Fishery Resources (http://www.nefsc.noaa.gov/sos/spsyn/pg/silverhake/).

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 and Packer 2004). In U.S. waters, two stocks have been identified based on differences of head and fin lengths (Almeida 1987), otolith morphometrics (Bolles and Begg 2000), otolith growth differences, and seasonal distribution patterns (Lock and 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 and Packer 2004).

Population Management and 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 New England Fishery Management Council's Northeast Multispecies Fishery Management Plan ("nonregulated multispecies" category). In 2000, the New England Fishery Management Council 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). In 2005, the 3-year average exploitation index for 2003-2005 was below the

FMSY proxy and the 3-year average biomass index remained above the ½ BMSY proxy, indicating that the stock is not overfished and overfishing is not occurring.

6.3.13 Loligo Squid

This description is quoted from the NEFSC Status of Fishery Resources (http://www.nefsc.noaa.gov/sos/spsyn/iv/lfsquid/).

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 (Brodziak and Macy 1996) 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 and Macy 1996).

Population Management and 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 Mid-Atlantic Fishery Management Council under the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan (FMP). Management measures for the L. pealeii stock include annual total allowable catches (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.

6.3.14 Atlantic Sea Scallops

Life History: This description is quoted from the NEFSC Status of Fishery Resources (http://www.nefsc.noaa.gov/sos/spsyn/iv/lfsquid/). 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 20°C (68°F). North of Cape Cod, concentrations generally occur in shallow water less than 40 m (22 fathoms) deep. South of Cape Cod and on Georges Bank, sea scallops typically occur at depths between 25 and 200 m (14 to 110 fathoms), with commercial concentrations generally between 35 and 100 m (19 to 55 fathoms). Sea scallops are filter feeders, feeding primarily on phytoplankton, but also on microzooplankton and detritus (Hart and Chute 2004). Sea scallops grow rapidly during the first several years of life. Between ages 3 and 5, they commonly increase 50 to 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.

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. Recreational fishing is insignificant. Sea scallops have a somewhat uncommon combination of life-history attributes: low mobility, rapid growth, and low natural mortality. The Council established the Scallop FMP in 1982. A number of Amendments and Framework Adjustments have been implemented since that time to adjust the original plan. The scallop resource was last assessed in 2010 (SARC 50) and it was not overfished, and overfishing was not occurring. The Scallop PDT has evaluated biomass and fishing mortality since and based on 2012 estimates, biomass is 119,000 mt, well above the threshold for an overfished stock (1/2 Bmsy = 62,000 mt), and almost at Bmsy (125,000 mt). The estimate of fishing mortality overall is 0.34, above the target F of 0.32 but below the overfishing limit threshold of 0.38. Total catch has been stable at about 20-30,000 mt since 2001, up from about 5,000 mt harvests of the late 1990s.

6.3.15 Interaction between Gear and Non-allocated Target Species and Bycatch

The majority of the proposed sectors have minimal operational history; therefore, the analysis of interactions between gear and non-allocated target species and bycatch is based in part on catch information for the Northeast Multispecies FMP common pool fishery from FY 1996 to FY 2006. It is also based on sector data from FY 2009 to FY 2011, as presented in Section 6.5.10.

The Final Supplemental Environmental Impact Statement to Amendment 2 to the Monkfish FMP (NEFMC and MAFMC 2003) evaluated the potential adverse effects of gears used in the directed monkfish fishery. It evaluated impacts for monkfish and other federally-managed species, as well as the effects of fishing activities regulated under other federal FMPs on monkfish. Bottom trawls and bottom gillnets and the two gears used in the monkfish fishery. Amendment 2 to the Monkfish FMP (NEFMC and MAFMC 2003) describes these gears in detail. Sectors would use these same gears in FY 2012.

Fishermen in the Northeast Region harvest skates in two very different ways. Fishermen harvest whole skates for lobster bait. They also harvest skate wings for food. Vessels tend to catch skates when targeting other species like groundfish, monkfish, and scallops. The vessels will land skate if the price is high enough. The recent NEFMC Amendment to the Skate FMP and accompanying Final Supplemental Environmental Impact Statement (NEFMC 2009b) contain detailed information about skate fisheries.

Dogfish have the potential to interact with all gear types used by the sectors.

Table 16 shows that otter trawl gear caught the majority of non-allocated target species and bycatch between FY 1996 to FY 2006.

Table 16- Landings (mt) for Non-allocated Target Species and Bycatch by Gear Type[a]

	Gear Type									
	Trawl		Gillnet		Dredge		Other Gear		Total[b]	
Species	Landings	Discard	Landings	Discard	Landings	Discard	**Landings**	**Discard**	Landings	Discard
Monkfish	NA	16,516	NA	6,526	NA	16,136	NA	4 [c]	228,000	39,182
Skates	117,381	315,308	29,711	26,601	--	146,725	4,413	2646 [d]	151,505	491,280
	24,368	61,914	72,712	39,852			946	--		
Dogfish					--	--			98,026	101,766

Notes:

NA = landings or discard data not available for individual fishery gear type for this species.

-- = None reported

[a] monkfish 1996-2006, skates 1996-2006, dogfish 1996-2005

[b.] Total landings or discards may differ slightly from the sum of the individual fishery entries due to differences in rounding.

[c] Shrimp Trawl

[d] Line and shrimp trawl

Source: Northeast Data Poor Stocks Working Group 2007a; Northeast Data Poor Stocks Working Group 2007b ; Sosebee et al. 2008; NEFSC 2006a.

6.4 Protected Resources

Numerous protected species inhabit the environment within the Northeast Multispecies FMP management unit. Therefore, many protected species potentially occur in the operations area of the fishery. These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act of 1973 (ESA) and/or the Marine Mammal Protection Act of 1972 (MMPA. As listed in Table 17, 17 marine mammal, sea turtle, and fish species are classified as endangered or threatened under the ESA, three others are candidate species under the ESA. The remaining species in Table 17 are protected by the MMPA and are known to interact with the Northeast multispecies fishery. Non ESA-listed species protected by the MMPA that utilize this environment and have no documented interaction with the Northeast multispecies fishery will not be discussed in this statement.

6.4.1 Species Present in the Area

Table 17 lists the species, protected either by the ESA, the MMPA, or both, that may be found in the environment utilized by sectors. Table 17 also includes three candidate fish species, as identified under the ESA.

A status review for Atlantic sturgeon was completed in 2007 which indicated that five distinct population segments (DPS) of Atlantic sturgeon exist in the United States (ASSRT 2007). On October 6, 2010, NMFS proposed listing these five DPSs of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species (75 FR 61872 and 75 FR 61904). A final listing was published on February 6th, 2012 (77 FR 5880 and 75 FR 5914). The GOM DPS of Atlantic sturgeon has been listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon have been listed as endangered. Atlantic sturgeon from any of the five DPSs could occur in areas where the multispecies fishery operates Atlantic sturgeon are known to be captured in sink gillnet, drift gillnet, and otter trawl gear (Stein *et al*. 2004a, ASMFC TC 2007). Of these gear types, sink gillnet gear poses the greatest known risk of mortality for bycaught sturgeon (ASMFC TC 2007). Sturgeon deaths were rarely reported in the otter trawl observer dataset , as well as sink gillnet and drift gillnet gear (ASMFC TC 2007).

Candidate species are those petitioned species that NMFS is actively considering for listing as endangered or threatened under the ESA. Candidate species also include those species for which NMFS has initiated an ESA status review through an announcement in the *Federal Register*.

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

Table 17 - Species Protected Under the Endangered Species Act and/or Marine Mammal Protection Act that May Occur in the Operations Area for the FY 2013 Sectors[a]

Species	Status
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted dolphin (*Stenella frontalis*)	Protected
Bottlenose dolphin (*Tursiops truncatus*)[b]	Protected
Harbor porpoise (*Phocoena phocoena*)	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered[c]
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic DPS	Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Atlantic sturgeon *(Acipenser oxyrinchus)*	
Gulf of Maine DPS	Threatened
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered
Cusk (*Brosme brosme*)	Candidate
Alewife (*Alosa pseudo harengus*)	Candidate
Blueback herring (*Alosa aestivalis*)	Candidate
Pinnipeds	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Phoca groenlandicus*)	Protected

Hooded seal (*Cystophora cristata*)	Protected

Notes:

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

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

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

Notes:

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

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

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

6.4.2 Species Potentially Affected

The multispecies fishery has the potential to affect the fish, sea turtle, cetacean, and pinniped species discussed below. Thus, the sectors also have this potential. A number of documents contain background information on the range-wide status of the protected species that occur in the area and are known or suspected of interacting with fishing gear (demersal gear including trawls, gillnets, and bottom longlines). These documents include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Turtle Expert Working Group 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b, recovery plans for ESA-listed cetaceans and sea turtles (NMFS 1991, 2005; NMFS and USFWS 1991a, 1991b; NMFS and USFWS 1992), the marine mammal stock assessment reports (e.g., Waring et al. 1995; 2011), and other publications (e.g., Clapham et al. 1999, Perry et al. 1999, Best et al. 2001, Perrin et al. 2002, ASSRT 2007).

6.4.2.1 Sea Turtles

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

On March 16, 2010, NMFS and USFWS published a proposed rule (75 FR 12598) to divide the worldwide population of loggerhead sea turtles into nine DPSs, as described in the 2009 Status Review. Two of the DPSs were proposed to be listed as threatened and seven of the DPSs, including the Northwest Atlantic Ocean DPS, were proposed to be listed as endangered. NMFS and the USFWS accepted comments on the proposed rule through September 13, 2010 (75 FR 30769, June 2, 2010). On March 22, 2011 (76 FR 15932), NMFS and USFWS extended the date by which a final determination on the listing action will be made to no later than September 16, 2011. This action was taken to address the interpretation of the existing data on status and trends and its relevance to the assessment of risk of extinction for the Northwest Atlantic Ocean DPS, as well as the magnitude and immediacy of the fisheries bycatch threat and measures to reduce this threat. New information or analyses to help clarify these issues were requested by April 11, 2011.

On September 22, 2011, NMFS and USFWS issued a final rule (76 FR 58868), determining that the loggerhead sea turtle is composed of nine DPSs (as defined in Conant *et al*., 2009) that constitute species that may be listed as threatened or endangered under the ESA. Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea), and four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean). Note that the Northwest Atlantic

Ocean (NWA) DPS and the Southeast Indo-Pacific Ocean DPS were original proposed as endangered. The NWA DPS was determined to be threatened based on review of nesting data available after the proposed rule was published, information provided in public comments on the proposed rule, and further discussions within the agencies. The two primary factors considered were population abundance and population trend. NMFS and USFWS found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats.

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

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

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

6.4.2.2 Large Cetaceans

The most recent Marine Mammal Stock Assessment Report (SAR) (Waring et al. 2012), covering the time period between 2005 and 2009, reviewed the current population trend for each of these cetacean species within U.S. Economic Exclusion Zone (EEZ) waters. The SAR also estimated annual human-caused mortality and serious injury. Finally, it described the commercial fisheries that interact with each stock in the U.S. Atlantic. The following paragraphs summarize information from the SAR.

The western North Atlantic baleen whale species (North Atlantic right, humpback, fin, sei, and minke whales) follow a general annual pattern of migration. They migrate from high latitude summer foraging grounds, including the Gulf of Maine and Georges Bank, to low latitude winter calving grounds (Perry et al. 1999, Kenney 2002). However, this is a simplification of species movements as the complete winter distribution of most species is unclear (Perry et al. 1999, Waring et al. 2012). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle et al. 1993, Wiley et al. 1995, Perry et al. 1999, Brown et al. 2002). Blue whales are most often sighted along the east coast of Canada, particularly in the Gulf of St. Lawrence. They occur only infrequently within the U.S. EEZ (Waring et al. 2002).

North Atlantic right whales are federally listed as endangered under the ESA and a revised recovery plan was published in June 2005. Available information suggests that the North Atlantic right whale population increased at a rate of 2.4 percent per year between 1990 and 2007. The total number of North Atlantic right whales is estimated to be at least 396 animals in 2006 (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury to right whales averaged 2.4 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 0.8 mortality or serious injury incidents per year, all in U.S. waters. The potential biological removal (PBR) level for this stock is 0.8 animals per year (Waring et al. 2012). The Potential Biological Removal (PBR) level is the maximum number of animals, not including natural mortalities, which may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

Humpback whales are also listed as endangered under the ESA, and a recovery plan was published for this species in 1991. The North Atlantic population of humpback whales is conservatively estimated to be 7,698 (Waring et al. 2012). The best estimate for the GOM stock of humpback whale population is 847 whales and cCurrent data suggest that the Gulf of Maine humpback whale stock is steadily increasing in size (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury to humpback whales averaged 5.2 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 3.8 mortality or serious injury incidents per year (3.4 from U.S. waters and 0.4 from Canadian waters). The PBR for this stock is 1.1 animals per year (Waring et al. 2012).

Fin, sei, and sperm whales are all federally listed as endangered under the ESA, with recovery plans currently in place. Based on data available for selected areas and time periods, the minimum population estimates for these western North Atlantic whale stocks are 3,269 fin whales, 208 sei whales (Nova Scotia stock) (Waring et al. 2012), and 3,539 sperm whales (Waring et al. 2007). Insufficient information exists to determine population trends for these large whale species.

The minimum rate of annual human-caused mortality and serious injury to fin whales averaged 2.6 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 0.8 mortality or serious injury incidents per year (0.6 from U.S. waters and 0.2 from Canadian waters). The PBR for this stock is 6.5 animals per year (Waring et al. 2012). For sei whales, the minimum rate of annual human-cause mortality and serious injury averaged 1.2 per year, of which 0.6 were a result of fishery interactions. PBR for the Nova Scotia sei whale stock is 0.4 (Waring et al. 2012). For both fin and sei whales, these estimates are likely biased low due to the low detection rate for these species. The most recent SAR for the North Atlantic sperm whale stock is from 2007 (covering the years 2001-2005) and during that time period, there were no recorded mortality or serious injury incidents due to entanglements (Waring et al. 2007). PBR for this stock is 7.1 animals per year.

Minke whales are not ESA-listed but are protected under the MMPA, with a minimum population estimate of 6,909 animals for the Canadian east coast stock; however, a population trend analysis has not been conducted for this stock (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury averaged 5.9 per year during 2005 to 2009, and of these, 3.5 animals per year were recorded through observed fisheries and 0.8 per year were attributed to U.S. fisheries using strandings and entanglement data (Waring et al. 2012). PBR for this stock is 69 animals per year.

More details on fisheries interactions with these species, as well as management actions in place to reduce entanglement risk, can be found in Section 4.5.4.

6.4.2.3 Small Cetaceans

There is fishing related mortality of numerous small cetacean species (dolphins, pilot whales, and harbor porpoises) associated with Northeast Multispecies fishing gear. Seasonal abundance and distribution of each species off the coast of the Northeast U.S. varies with respect to life history characteristics. Some species such as white-sided dolphins and harbor porpoises primarily occupy continental shelf waters. Other species such as the Risso's dolphin occur primarily in continental shelf edge and slope waters. Still other species like the common dolphin and the spotted dolphin occupy all three habitats. Waring et al. (2012) summarizes information on the distribution and geographic range of western North Atlantic stocks of each species.

The most commonly observed small cetaceans recorded as bycatch in multispecies fishing gear (e.g., gillnets and trawls) are harbor porpoises, white-sided dolphins, common dolphins, and pilot whales. These species are described in a bit more detail here. Harbor porpoises are found seasonally within New England and Mid-Atlantic waters. In the Mid-Atlantic, porpoises are present in the winter/spring (typically January through April) and in southern New England waters from December through May. In the Gulf of Maine, porpoises occur largely from the fall through the spring (September through May) and in the summer are found in northern Maine and through the Bay of Fundy and Nova Scotia area. White-sided dolphin distribution shifts seasonally, with a large presence from Georges Bank through the Gulf of Maine from June through September, with intermediate presence from Georges Bank through the lower Gulf of Maine from October through December. Low numbers are present from Georges Bank to Jeffrey's Ledge from January through May (Waring et al. 2012). Common dolphins are widely distributed over the continental shelf from Maine through Cape Hatteras, North Carolina. From mid-January to May they are dispersed from North Carolina through Georges Bank, and then move onto Georges Bank and the Scotia shelf from the summer to fall. They are occasionally found in the Gulf of Maine (Waring et al. 2012). Pilot whales are generally distributed along the continental shelf edge off the northeastern U.S. coast in the winter and early spring. In late spring, the move onto Georges Bank and into the Gulf of Maine and remain until late fall. They do occur along the Mid-Atlantic shelf break between Cape Hatteras, North Carolina and New Jersey (Waring et al. 2012). Since pilot whales are difficult to differentiate at sea, they are generally considered *Globicephala* sp. when they are recorded at sea (Waring et al. 2012).

6.4.2.4 Pinnipeds

Harbor seals have the most extensive distribution of the four species of seal expected to occur in the area. Harbor seals sighting have occurred far south as 30° N (Katona et al. 1993, Waring et al. 2012). Their approximate year-round range extends from Nova Scotia, through the Bay of Fundy, and south through Maine to northern Massachusetts (Waring et al. 2012). Their more seasonal range (September through May) extends from northern Massachusetts south through southern New Jersey, and stranding records indicate occasional presence of harbor seals from southern New Jersey through northern North Carolina (Waring et al. 2012). Gray seals are the second most common seal species in U.S. EEZ waters. They occur from Nova Scotia through the Bay of Fundy and into waters off of New England (Katona et al. 1993; Waring et al. 2011) year-round from Maine through southern Massachusetts (Waring et al. 2012). A more seasonal distribution of gray seals occurs from southern Massachusetts through southern New Jersey from September through May. Similar to harbor seals, occasional presence from southern New Jersey through northern North Carolina indicate occasional presence of gray seals in this region (Waring et al. 2012). Pupping for both species occurs in both U.S. and Canadian waters of the western North Atlantic. The majority of harbor seal pupping is thought to occur in U.S. waters. While there are at least three gray seal pupping colonies in U.S., the majority of gray seal pupping likely occurs in Canadian waters. Observations of harp and hooded seals are less common in U.S. EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring. They then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch information (Waring et al. 2012).

6.4.2.5 Atlantic Sturgeon

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

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

6.4.3 Species and Habitats Not Likely to be Affected

NMFS has determined that the action being considered in this EA is not likely to adversely affect shortnose sturgeon, the Gulf of Maine distinct population segment (DPS) of Atlantic salmon, hawksbill sea turtles, blue whales, or sperm whales, all of which are listed as endangered species under the ESA. Further, the action considered in this EA is not likely to adversely affect North Atlantic right whale (discussed in Section 6.4.2.1) critical habitat. The following discussion provides the rationale for these determinations.

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

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

North Atlantic right whales occur in coastal and shelf waters in the western North Atlantic (NMFS 2005). Section 4.5.2.2 discusses potential fishery entanglement and mortality interactions with North Atlantic right whale individuals. The western North Atlantic population in the U.S. primarily ranges from winter calving and nursery areas in coastal waters off the southeastern U.S. to summer feeding grounds in New England waters (NMFS 2005). North Atlantic Right Whales use five well-known habitats annually, including multiple in northern waters. These northern areas include the Great South Channel (east of Cape Cod); Cape Cod and Massachusetts Bays; the Bay of Fundy; and Browns and Baccaro Banks, south of Nova Scotia. NMFS designated the Great South Channel and Cape Cod and Massachusetts Bays as Northern Atlantic right whale critical habitat in June 1994 (59 FR 28793). NMFS has designated additional critical habitat in the southeastern U.S. Multispecies gear operates in the ocean at or near the bottom rather than near the surface. It is not known whether the bottom-trawl, or any other type of fishing gear, has an impact on the habitat of the Northern right whale (59 FR 28793). As discussed in the FY 2010 and FY 2011 sector EAs and further in Section 5.1, sectors would result in a negligible effect on physical habitat. Therefore, FY 2013 sector operations would not result in a significant impact on Northern right whale critical habitat. Further, mesh sizes used in the multispecies fishery do not significantly impact the Northern right whale's planktonic food supply (59 FR 28793). Therefore, Northern right whale food sources in areas designated as critical habitat would not be adversely affected by sectors. For these reasons, Northern right whale critical habitat will not be considered further in this EA.

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

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

Unlike blue whales, sperm whales do regularly occur in waters of the U.S. EEZ. However, the distribution of the sperm whales in the U.S. EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2007). Sperm whale distribution is typically concentrated east-northeast of Cape Hatteras in winter and shifts northward in spring when whales are found throughout the Mid-Atlantic Bight (Waring et al. 2006). Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring et al. 1999). In contrast, the sectors would operate in continental shelf waters. The average depth over which sperm whale sightings occurred during the Cetacean and Turtle Assessment Program surveys was 5,879 ft (1,792 m) (Cetacean and Turtle Assessment Program 1982). Female sperm whales and young males almost always inhabit open ocean, deep water habitat with bottom depths greater than 3,280 ft (1,000 m) and at latitudes less than 40° N (Whitehead 2002). Sperm whales feed on large squid and fish that inhabit the deeper ocean regions (Perrin et al. 2002). There were no observed fishery-related mortalities or serious injuries to sperm whales between 2001 and 2005 (Waring et al. 2007). Sperm whales are unlikely to occur in water depths where the sectors would operate, sector operations would not affect the availability of sperm whale prey or areas where calving and nursing of young occurs. Therefore, the Proposed Action would not be likely to adversely affect sperm whales.

Although marine turtles and large whales could be potentially affected through interactions with fishing gear, NMFS has determined that the continued authorization of the multispecies fishery, and therefore the FY 2011 sectors, would not have any adverse effects on the availability of prey for these species. Sea turtles feed on a variety of plants and animals, depending on the species. However, none of the turtle species are known to feed upon groundfish. Right whales and sei whales feed on copepods (Horwood 2002, Kenney 2002). The multispecies fishery will not affect the availability of copepods for foraging right and sei whales because copepods are very small organisms that will pass through multispecies fishing gear rather than being captured in it. Humpback whales and fin whales also feed on krill as well as small schooling fish such as sand lance, herring and mackerel (Aguilar 2002, Clapham 2002). Multispecies fishing gear operates on or very near the bottom. Fish species caught in multispecies gear are species that live in benthic habitat (on or very near the bottom) such as flounders. As a result, this gear does not typically catch schooling fish such as herring and mackerel that occur within the water column. Therefore, the continued authorization of the multispecies fishery or the approval of the FY 2013 sector operations plans will not affect the availability of prey for foraging humpback or fin whales.

6.4.4 Interactions Between Gear and Protected Resources

Marine Mammals

NMFS categorizes commercial fisheries based on a two-tiered, stock-specific fishery classification system that addresses both the total impact of all fisheries on each marine mammal stock as well as the impact of individual fisheries on each marine mammal stock. NMFS bases the system on the numbers of animals per year that incur incidental mortality or serious injury due to commercial fishing operations relative to a marine mammal stock's PBR level. Tier 1 takes into account the cumulative mortality and serious injury to marine mammals caused by commercial fisheries. Tier 2 considers marine mammal mortality and serious injury caused by the individual fisheries. This EA uses Tier 2 classifications to indicate how each type of gear proposed for use in the Proposed Action may affect marine mammals (NMFS 2009b). Table 18 identifies the classifications used in the final List of Fisheries (for FY 2012 (76 FR 73912; November 29, 2011; NMFS 2011), which are broken down into Tier 2 Categories I, II, and III.

Table 18 - Descriptions of the Tier 2 Fishery Classification Categories (50 CFR 229.2)

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

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

Although interactions between protected species and gear deployed by the Northeast Multispecies fishery would vary, interactions generally include:

- becoming caught on hooks (bottom longlines)
- entanglement in mesh (gillnets and trawls)
- entanglement in the float line (gillnets and trawls)
- entanglement in the groundline (traps/pots, gillnets, trawls, and bottom longlines)
- entanglement in anchor lines (gillnets and bottom longlines), or
- entanglement in the vertical lines that connect gear to the surface and surface systems (gillnets, traps/pots, and bottom longlines).

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

Table 19 lists the marine mammals known to have had interactions with gear used by the Northeast multispecies fishery. This gear includes sink gillnets, traps/pots, bottom trawls, and bottom longlines within the Northeast multispecies region, as excerpted from the List of Fisheries for FY 2012 ([76 FR 73912; November 29, 2011], also see Waring et al. 2009). Sink gillnets have the greatest potential for interaction with protected resources, followed by bottom trawls. There are no observed reports of interactions between longline gear and marine mammals in FY 2009 through FY 2011. However, interactions between the pelagic longline fishery and both pilot whales and Risso's dolphins led to the development of the Pelagic Longline Take Reduction Plan.

Table 19 - Marine Mammal Species and Stocks Incidentally Killed or Injured Based on Northeast Multispecies Fishing Areas and Gear Types (based on 2012 List of Fisheries)

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

Fishery Category	Fishery Type	Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category II	Mid-Atlantic bottom trawl	1,388	Bottlenose dolphin, WNA offshore Common dolphin, WNA [a] Long-finned pilot whale, WNA [a] Risso's dolphin, WNA Short-finned pilot whale, WNA [a] White-sided dolphin, WNA
	Northeast bottom trawl	2,584	Common dolphin, WNA Harbor porpoise, GOM/ Bay of Fundy Harbor seal, WNA Harp seal, WNA Long-finned pilot whale, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA [a]
	Atlantic mixed species trap/pot [c]	3,526	Fin whale, WNA Humpback whale, GOM
Category III	Northeast/Mid-Atlantic bottom longline/hook-and-line	>1,281	None documented in recent years

Notes:

[a] Fishery classified based on serious injuries and mortalities of this stock, which are greater than 50 percent (Category I) or greater than 1 percent and less than 50 percent (Category II) of the stock's PBR.

Table 20 shows trends in marine mammal and ESA listed species takes from FY 2009 to FY 2011 (fishing years as opposed to calendar years) as recorded in the ASM and observer program data. This data comes from trips that were potentially using sector ACE.

Table 20 - Marine Mammal and ESA listed Species Takes By Gear as Recorded in ASM and Observer Program Universe: Trips Potentially Using Sector ACE in FY 2009-FY2011 Data as of: October 18, 2012

Gear Name	Species Category	Common Name	Scientific Name	2009 Takes	2010 Takes	2011 Takes
GILL NET, DRIFT-SINK, FISH	pinniped	SEAL, HARBOR	PHOCA VITULINA CONCOLOR	2	0	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	PORPOISE, HARBOR	PHOCOENA PHOCOENA	18	31	10
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	PORPOISE/DOLPHIN, NK	PHOCOENIDAE/DELPHINIDAE	0	0	2
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	DOLPHIN, NK (MAMMAL)	DELPHINIDAE	0	0	1
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	DOLPHIN, WHITESIDED	LAGENORHYNCHUS ACUTUS	1	1	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	DOLPHIN,COMMON (OLD SADDLEBACK)	DELPHINUS DELPHIS (COMMON)	1	1	2
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	MARINE MAMMAL, NK	CETACEA/PINNIPEDIA	0	1	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	cetation	WHALE, PILOT, NK	GLOBICEPHALA SP	0	1	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	pinniped	SEAL, HARBOR	PHOCA VITULINA CONCOLOR	27	4	30
GILL NET, FIXED OR ANCHORED,SINK, OTHER	pinniped	SEAL, NK	PHOCIDAE	9	9	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	pinniped	SEAL, GRAY	HALICHOERUS GRYPUS	52	41	53
GILL NET, FIXED OR ANCHORED,SINK, OTHER	pinniped	SEAL, HARP	PHOCA GROENLANDICA	2	1	0
GILL NET, FIXED OR ANCHORED,SINK, OTHER	turtle	TURTLE, NK HARD-SHELL	CHELONIIDAE	1	0	1
TRAWL,OTTER,BOTTOM,FISH	cetation	DOLPHIN, WHITESIDED	LAGENORHYNCHUS ACUTUS	9	35	9
TRAWL,OTTER,BOTTOM,FISH	cetation	DOLPHIN, NK (MAMMAL)	DELPHINIDAE	0	0	5
TRAWL,OTTER,BOTTOM,FISH	cetation	PORPOISE, HARBOR	PHOCOENA PHOCOENA	0	1	4
TRAWL,OTTER,BOTTOM,FISH	cetation	WHALE, PILOT, NK	GLOBICEPHALA SP	3	6	2
TRAWL,OTTER,BOTTOM,FISH	cetation	DOLPHIN,COMMON (OLD SADDLEBACK)	DELPHINUS DELPHIS (COMMON)	3	6	4
TRAWL,OTTER,BOTTOM,FISH	cetation	DOLPHIN, RISSOS	GRAMPUS GRISEUS	1	0	0
TRAWL,OTTER,BOTTOM,FISH	cetation	WHALE, NK	CETACEA, WHALE	0	0	1
TRAWL,OTTER,BOTTOM,FISH	pinniped	SEAL, HARBOR	PHOCA VITULINA CONCOLOR	0	3	0
TRAWL,OTTER,BOTTOM,FISH	pinniped	SEAL, GRAY	HALICHOERUS GRYPUS	5	2	5
TRAWL,OTTER,BOTTOM,FISH	turtle	TURTLE, LOGGERHEAD	CARETTA CARETTA	1	0	2

TRAWL,OTTER,BOTTOM,FISH	turtle	TURTLE, LEATHERBACK	DERMOCHELYS CORIACEA	0	1	0
TRAWL,OTTER,BOTTOM,HADDOCK SEPARATOR	cetation	DOLPHIN,COMMON (OLD SADDLEBACK)	DELPHINUS DELPHIS (COMMON)	0	2	6
TRAWL,OTTER,BOTTOM,HADDOCK SEPARATOR	cetation	WHALE, PILOT, NK	GLOBICEPHALA SP	1	1	1
TRAWL,OTTER,BOTTOM,HADDOCK SEPARATOR	pinniped	SEAL, GRAY	HALICHOERUS GRYPUS	0	0	1
TRAWL,OTTER,BOTTOM,RUHLE	cetation	WHALE, PILOT, NK	GLOBICEPHALA SP	2	0	0
TRAWL,OTTER,BOTTOM,RUHLE	cetation	DOLPHIN, WHITESIDED	LAGENORHYNCHUS ACUTUS	0	1	0
TRAWL,OTTER,BOTTOM,RUHLE	cetation	DOLPHIN,COMMON (OLD SADDLEBACK)	DELPHINUS DELPHIS (COMMON)	1	0	0
TRAWL,OTTER,BOTTOM,RUHLE	pinniped	SEAL, GRAY	HALICHOERUS GRYPUS	0	0	1

Marine mammals are taken in gillnets, trawls, and trap/pot gear used in the Northeast Multispecies area. Documented marine mammal interactions in Northeast sink gillnet and Mid-Atlantic gillnet fisheries include harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, hooded seal, pilot whale, bottlenose dolphin (various stocks), Risso's dolphin, and common dolphin. Table 21 and Table 22 summarize the estimated mean annual mortality of small cetaceans and seals that are taken in the Northeast sink gillnet and Mid-Atlantic gillnet fisheries according to the most recent SAR for each particular species.

Documented marine mammal interactions with Northeast and Mid-Atlantic bottom trawl fisheries include minke whale, harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, pilot whale, and common dolphin. Table 23 and Table 24 provide the estimated mean annual mortality of small cetaceans and seals that are taken in the Northeast and Mid-Atlantic bottom trawl fisheries, based on the most recent SAR for each particular species. The data in these tables are based on takes observed by fishery observers as part of the Northeast Fisheries Observer Program (NEFOP).

Table 21 - Estimated Marine Mammal Mortalities in the Northeast Sink Gillnet Fishery

Species	**Years Observed**	**Mean Annual Mortality (CV)**	**Total PBR**
Harbor porpoise	05-09	559 (0.16)	701
Atlantic white-sided dolphin	05-09	36 (0.34)	190
Common dolphin (short-beaked)	05-09	26 (0.39)	1,000
Risso's dolphin	05-09	3 (0.93)	124
Western North Atlantic Offshore bottlenose dolphin	02-06	Unknown+	566
Harbor seal	05-09	332 (0.14)	Undetermined
Gray seal	05-09	678 (0.14)	Undetermined
Harp seal	05-09	174 (0.18)	Unknown
Hooded seal	01-05	25 (0.82)	Unknown

Source: Waring et al. (2009, 2012)

+While there have been documented interactions between the Western North Atlantic Offshore bottlenose dolphin stock and the Northeast sink gillnet fishery during the five year time period, estimates of bycatch mortality in the fishery have not been generated.

Table 22 - Estimated Marine Mammal Mortalities in the Mid-Atlantic Gillnet Fishery

Species	**Years Observed**	**Mean Annual Mortality (CV)**	**Total PBR**
Harbor porpoise	05-09	318 (0.26)	701
Common dolphin (short-beaked)	05-09	2.2 (1.03)	1,000
Risso's dolphin	05-09	7 (0.73)	124
Bottlenose dolphin	06-08		
Western North Atlantic Northern Migratory Coastal stock		5.27 (0.19) min; 6.02 (0.19) max	71
Western North Atlantic Southern Migratory Coastal stock	06-08	5.71 (0/31 min; 41.91 (0.14) max	96
Northern North Carolina Estuarine System stock	06-08	2.39 (0.25) min; 18.99 (0.11) max	Undetermined
Southern North Carolina Estuarine System stock	06-08	0.61 (0.30) min; 0.92 (0.21) max	16
Western North Atlantic Offshore stock	02-06	Unknown+	566
Harbor seal	05-09	45 (0.39)	Undetermined
Harp seal	05-09	57 (0.5)	Unknown

Source: Waring et al. (2009, 2012)

+While there have been documented interactions between the Western North Atlantic Offshore bottlenose dolphin stock and the Mid-Atlantic gillnet fishery during the five year time period, estimates of bycatch mortality in the fishery have not been generated.

Table 23 - Estimated Marine Mammal Mortalities in the Northeast Bottom Trawl Fishery

Species	**Years Observed**	**Mean Annual Mortality (CV)**	**Total PBR**
Minke whale	05-09	3.5 (0.34)	69
Harbor porpoise	05-09	6 (0.22)	701
Atlantic white-sided dolphin	05-09	160 (0.14)	190
Common dolphin (short-beaked)	05-09	23 (0.13)	1,000
Pilot whales*	05-09	12 (0.14)	93 (long-finned); 172 (short-finned)
Harbor seal	05-09	Unknown+	Undetermined
Gray seal	05-09	Unknown+	Undetermined
Harp seal	05-09	Unknown+	Unknown

Source: Waring et al. (2012)

*Total fishery-related serious injuries and mortalities to pilot whales (*Globicephala* sp.) cannot be differentiated to species due to uncertainty in species identification by fishery observers (Waring et al. 2012). However, separate PBRs have been calculated for long-finned and short-finned pilot whales.

+While there have been documented interactions between these species and the Northeast bottom trawl fishery during the five year time period, estimates of bycatch mortality in the fishery have not been generated.

Table 24 - Estimated Marine Mammal Mortalities in the Mid-Atlantic Bottom Trawl Fishery

Species	Years Observed	Mean Annual Mortality (CV)	Total PBR
Atlantic white-sided dolphin	05-09	23 (0.12)	190
Common dolphin (short-beaked)	05-09	110 (0.13)	1,000
Pilot whales*	05-09	30 (0.16)	93 (long-finned); 172 (short-finned)

Source: Waring et al. (2012)

*Total fishery-related serious injuries and mortalities to pilot whales (*Globicephala* sp.) cannot be differentiated to species due to uncertainty in species identification by fishery observers (Waring et al. 2012). However, separate PBRs have been calculated for long-finned and short-finned pilot whales.

Takes of large whales are typically not documented within observer records as large whales are typically entangled in fixed fishing gear and the chances of observing an interaction are small. Although large whales can become anchored in gear, they more often swim off with portions of the fishing gear; therefore, documentation of their incidental take is based primarily on the observation of gear or markings on whale carcasses, or on whales entangled and observed at-sea. Even if a whale is anchored in fishing gear, it is extremely difficult to make any inferences about the nature of the entanglement event and initial interaction between the whale and the gear. Frequently, it is difficult to attribute a specific gear type to an entangled animal based on observed scars or portions of gear remaining attached to whales or their carcasses; however, gillnet gear has been identified on entangled North Atlantic right whales, humpback whales, fin whales, and minke whales. Minke whales have been observed to be taken in the Northeast bottom trawl fishery by fishery observers. The annual estimated mortality and serious injury to minke whales from this fishery was 3.5 (CV = 0.34) between 2005 and 2009 (Waring et al. 2012). At this time, there is no evidence suggesting that other large whale species interact with trawl gear fisheries.

A number of marine mammal management plans are in place along the U.S. east coast to reduce serious injuries and deaths of marine mammals due to interactions with commercial fishing gear. Multispecies fishing vessels are required to adhere to measures in the Atlantic Large Whale Take Reduction Plan (ALWTRP), which manages from Maine through Florida, to minimize potential impacts to certain cetaceans. The ALWTRP was developed to address entanglement risk to right, humpback, and fin whales, and to acknowledge benefits to minke whales in specific Category I or II commercial fishing efforts that utilize traps/pots and gillnets. This includes the Northeast sink gillnet and Mid-Atlantic gillnet fisheries. The ALWTRP calls for the use of gear markings, area restrictions, weak links, and sinking groundline. Fishing vessels would be required to comply with the ALWTRP in all areas where gillnets were used.

Fishing vessels would also be required to comply, where applicable, with the seasonal gillnet requirements of the Bottlenose Dolphin Take Reduction Plan (BDTRP), which manages coastal waters from New Jersey through Florida, and Harbor Porpoise Take Reduction Plan (HPTRP), which manages coastal and offshore waters from Maine through North Carolina. The BDTRP spatially and temporally restricts night time use of gillnets and requires net tending in the Mid-Atlantic gillnet region. The HPTRP aims to reduce interactions between harbor porpoises and gillnets in the Gulf of Maine, southern New England, and Mid-Atlantic regions. In New England waters, the HPTRP implements seasonal area closures and the seasonal use of pingers (acoustic devices that emit a sound) to deter harbor porpoises from approaching the nets. In Mid-Atlantic waters, the HPTRP implements seasonal area closures and the seasonal use of gear modifications for large mesh (7-18 in) and small mesh (<5 to >7 in) gillnets to reduce harbor porpoise bycatch.

An Atlantic Trawl Gear Take Reduction Team was formed in 2006 to address the bycatch of white-sided and common dolphins and pilot whales in Northeast and Mid-Atlantic trawl gear fisheries. While a take reduction plan with regulatory measures was not implemented (bycatch levels were not exceeding allowable thresholds under the MMPA), a take reduction strategy was developed that recommends voluntary measures to be used to reduce the chances for interactions between trawl gear and these marine mammal species. The two voluntary measures that were recommended are: 1) reducing the number of turns made by the fishing vessel and tow times while fishing at night; and 2) increasing radio communications between vessels about the presence and/or incidental capture of a marine mammal to alert other fishermen of the potential for additional interactions in the area.

Sea Turtles

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

Atlantic Sturgeon

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

In an updated, preliminary analysis, the Northeast Fisheries Science Center (NEFSC) was able to use data from the NEFOP database to provide updated estimates for the 2006 to 2010 timeframe. Data were limited by observer coverage to waters outside the coastal boundary (fzone>0) and north of Cape Hatteras, NC. Sturgeon included in the data set were those identified by federal observers as Atlantic sturgeon, as well as those categorized as unknown sturgeon.

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

These additional data support the conclusion from the earlier bycatch estimates that the multispecies fishery may interact with Atlantic sturgeon. Since the Atlantic sturgeon DPSs have been listed as endangered and threatened under the ESA, the ESA Section 7 consultation for the multispecies fishery will be reinitiated, and additional evaluation will be included in the resulting Biological Opinion to describe any impacts of the fisheries on Atlantic sturgeon and define any measures needed to mitigate those impacts, if necessary. It is anticipated that any measures, terms and conditions included in an updated Biological Opinion will further reduce impacts to the species.

On February 6, 2012, NMFS issued two final rules (77 FR 5880-5912; 77 FR 5914-5982) listing five Distinct Population Segments (OPS) of Atlantic sturgeon as threatened or endangered. Four DPSs (New York Bight, Chesapeake Bay, Carolina and South Atlantic) are listed as endangered and one DPS (Gulf of Maine) is listed as threatened. The effective date of the listing is April 6, 2012. The ESA and the Section 7 regulations (50 CFR 402.14) require that formal consultation be conducted when a new species is listed per the ESA that may occur within the action area. We anticipate completing a biological opinion assessing potential impacts to Atlantic sturgeon prior to the 2013 fishing year for the multispecies fleet.

6.5 Human Communities/Social-Economic Environment

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

The remainder of 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 participantsgroundfish fishing as well as their homeports.

6.5.1 Overview of New England Groundfish Fishery

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

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

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

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

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

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

In 2004, the final rule implementing Amendment 13 to the Northeast Multispecies FMP allowed for self-selecting groups of limited access groundfish permit holders to form sectors. These sectors developed a legally binding operations plan and operated under an allocation of GB cod. While approved sectors were subject to general requirements specified in Amendment 13, sector members were exempt from DAS and some of the other effort control measures that tended to limit the flexibility of fishermen. The 2004 rule also authorized implementation of the first sector, the GB Cod Hook Sector. A second sector, the GB Cod Fixed Gear Sector, was authorized in 2006.

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

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

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

Amendment 16 to the Northeast Multispecies Fishery Management Plan (FMP) was finally implemented for the New England groundfish fishery starting on May 1st 2010, the start of the 2010 fishing year. The new management program contained two 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. Sectors received ACE for nine of 13 groundfish species (14 stocks + quotas for Eastern U.S./ Canada cod and haddock; 16 ACEs) in the FMP and became exempt from many of the effort controls previously used to manage the fishery.

During the first year of sector management seventeen sectors operated, each establishing its own rules for using its allocations. Vessels with limited access permits that joined sectors were allocated 98% of the total 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 participated in one of 16 sectors or one of 2 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 the 2011 fishing year, 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. 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 are also a reflection of the current system of sector management.

6.5.2 Trends in the Number of Vessels

In 2010, the first year of sector management, the Northeast Multispecies fishery issued 1,382 permits, not including groundfish limited access eligibilities held as Confirmation of Permit History (CPH). Out of these permits, 753 vessels belonged to a sector and 640 remained in the Common Pool (Table 25). Not all permitted vessels were active and not all active vessels fished groundfish. Of the 740 sector vessels issued groundfish permits, only 440 were considered active, having revenue from any landed species, and only 303 of those had revenue from at least one groundfish trip. Among common pool vessels, 456 were considered active, and only 142 vessels had made at least one groundfish trip.

The overall trend since the start of sector management has been a decreasing number of vessels with a limited access groundfish permit. By 2011 the total number of vessels with a limited access groundfish permit decreased slightly to 1,279. The number of vessels belonging to a sector actually increased to 772 in 2011 while the number of vessels in the Common Pool decreased to 518. Of the 772 sector vessels issued a groundfish permit in 2011, 446 were considered active, and only 301 of those had revenue from at least one groundfish trip. Among common pool vessels, 366 were considered active, and only 121 vessels had made at least one groundfish trip.

Table 25 - Number of vessels by fishing year

	2007	2008	2009	2010 Total	2010 Sector Vessels	2010 Common Pool	2011 Total	2011 Sector Vessels	2011 Common Pool
Vessels with a limited access groundfish permit	1413	1410	1431	1382	753	640	1279	772	518
... those with revenue from any species	1082	1012	957	890	440	456	805	446	366
... those with revenue from at least one groundfish trip	658	611	570	445	303	142	420	301	121
... those with no landings	331 (32%)	398 (28%)	474 (33%)	492 (36%)	313 (42%)	184 (29%)	474 (37%)	326 (42%)	152 (30%)

* These numbers exclude groundfish limited access eligibilities held as Confirmation of Permit History (CPH). Starting in 2010, Amendment 16 authorized CPH owners to join Sectors and to lease DAS. For purposes of comparison, CPH vessels are not included in the 2010 and 2011 data for either sector or common pool.

A key aspect of Amendment 16, and catch share programs in general, is the ability to jointly decide how a sector will harvest its ACE through redistribution within a sector and the ability to transfer ACE between sectors. Because it is then not possible to identify the extent to which inactive vessels in a sector may benefit if other sector vessels harvest their allocation, changes in the number of inactive vessels may describe a transfer of allocation and not necessarily vessels exiting the fishery. In 2010, 492 vessels (36%) were inactive (no landings). Of these inactive vessels, 313 were sector vessels and 184 were common pool vessels. By 2011 the total number of inactive vessels had declined to 474 but because the number of vessels with a limited access groundfish permit declined, there was only a slight rise in the relative proportion of inactive vessels (37%). The number of inactive sector vessels increased to 326 in 2011, but again because the number of vessels with a limited access groundfish permit belonging to a sector also increased, the relative proportion of inactive sector vessels (42%) remained the same. 152 common pool vessels were inactive in 2011, which is about 30% of the Common Pool. The number of inactive vessels in 2011 can be compared to the number of inactive vessels in other years: 331 vessels (32%) in 2007, 398 vessels (28%) in 2008, and 474 vessels (33%) in 2009.

6.5.3 Trends in Landings

Total groundfish landings on trips made by vessels possessing a limited access groundfish permit in 2011 were 61.7 million pounds, which is an increase from 2010 but a decline from a recent high of 72.2 million pounds in 2008. 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 178.1 million pounds in 2010 to 213.8 million pounds in 2011. Total landings of all species made by limited access vessels in the Northeast Multispecies fishery was about 275.5 million pounds in 2011. This compares to landings ranging from 259.5 million pounds to 277.1 million pounds in the 2007–2010 fishing years (Table 26). While sector vessels accounted for 69% of all landings made in 2011, sector vessels also made 99% of groundfish landings and 60% of non-groundfish landings.

Table 26 - Landings in Thousands of Pounds by Year

				2010			2011		
Landings	**2007**	**2008**	**2009**	**Total**	**Sector Vessels**	**Common Pool**	**Total**	**Sector Vessels**	**Common Pool**
Total Landings	259448	277118	258954	236695	155529	81166	275506	85147	5580
Total Groundfish Landings	64004	72162	69775	58622	57217	1404	61721	61038	471
Total Non-groundfish Landings	195444	204955	189180	178073	98312	79762	213785	24108	5109

Combined, 161 million (live) pounds of ACE was allotted to the sectors in 2011 but only 70 million (live) pounds were landed. Of the 16 ACEs allocated to sectors, the catch of 7 stocks approached (>80% conversion) the catch limit set by the total allocated ACE (Table 27). By comparison, the catch of only 5 stocks approached the catch limit set by the total allocated ACE in 2010. The catch of white hake in 2011 was particularly close to reaching the limit, with 98% of the white hake ACE being realized. As was the case in 2010, the majority of the unrealized landings in 2011 were caused by a failure to land Georges Bank haddock. Collectively, East and West GB haddock, accounted for 63 million pounds (62%) of the un-landed ACE in 2011.

Table 27 - Catch and ACE (live lbs)

	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%***	**11,242,220**	**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%*
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%*

*includes FY2010 carryover

Notes: stocks with > 80% ACE conversion highlighted in bold font

6.5.4 Trends in Revenue

During the first year of sector management, groundfish revenues from vessels with limited access groundfish permits in 2010, were $83 million (Table 28). This was lower than 2007 – 2009 nominal revenues which ranged from $84.1 million in 2009 to $90.1 million in 2008. By 2011 the groundfish revenues from vessels with limited access groundfish permits had risen to $90.1 million. During the same time Non-groundfish revenues in 2011 were $240.7 million. Non-groundfish revenues from 2007 – 2010 ranged from $186.1 million in 2009 to $211.5million in 2010. Revenues from all species for 2011 totaled $330.8 million, which compares to pervious revenues that ranged from a low of $271.1 million in 2009 to a high of $298.2 million in 2007. Sector vessels accounted for about 71% of all revenue earned by limited access permitted vessels in 2011. Sector vessels also earned 99% of revenue from groundfish landings and 60% of non-groundfish revenue.

Table 28 - Revenue in Thousands of Dollars by Year

				2010			2011		
Landings	**2007**	**2008**	**2009**	**Total**	**Sector Vessels**	**Common Pool**	**Total**	**Sector Vessels**	**Common Pool**
Total Landings	$298,246	$291,479	$266,765	$294,505	$196,625	$97,880	$330,885	$233,922	$96,962
Total Groundfish Landings	$89,055	$90,132	$84,112	$82,984	$80,750	$2,234	$90,115	$89,144	$971
Total Non-groundfish Landings	$209,191	$201,347	$182,653	$211,521	$115,875	$95,645	$240,769	$144,778	$95,991

6.5.5 Trends in ACE Leasing

Starting with allocations in 2010, each sector was given an initial annual catch entitlement (ACE) determined by the pooled potential sector contribution (PSC) from each vessel joining that sector. 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 the first year of sector management, 281 Sector-affiliated vessels had catch that exceeded their individual PSC allocations for at least one stock. These vessels are then assumed to have leased in an additional 22 million pounds of ACE and/or PSC with an approximate value of $13.5 million. In 2011 256 Sector-affiliated vessels had catch that exceeded their individual PSC allocations. To account for the additional catch these vessels would have had to lease an additional 31 million pounds of quota, either as PSC from within the sector or as ACE from another sector. Although the number of vessels leasing ACE fell by 9% the estimated number of pounds leased was almost 41% greater in 2011 than in 2010.

6.5.6 Trends in Effort

Some of the proposed benefits of a catch share system of management are the potential efficiency gains associated with increasing operational flexibility. Being released from the former effort controls but being held by ACLs, sector vessels were expected to increase their catch per unit effort by decreasing effort. Between 2009 and 2010, the total number of groundfish fishing trips and total days absent on groundfish trips declined by 48% and 27%, respectively (26,056 trips in 2009 vs. 13,441 trips in 2010; 24,237 days absent in 2009 vs. 17,614 days absent in 2010) (Table Table 29). During the second year of sector management, 2011, the number of groundfish fishing trips and total days absent on groundfish trips increased by 19% and 18% respectively (13,441 trips in 2010 vs. 15,929 trips in 2011; 17,614 days absent in 2010 vs. 20,724 days absent in 2011) (Table 4.6.5-1). Note, in the following analysis, a groundfish trip is defined as a trip where the vessel owner or operator declared, either through the vessel monitoring system or through the interactive voice response system, that the vessel was making a groundfish trip. The following data is taken from different source materials (VMS, etc.) than the data presented earlier in Section 4.1, and for the reasons stated in Section 4.1, this data may be slightly different than what is presented elsewhere in the document. While the number of groundfish fishing trips and total days absent on groundfish trips increased during the second year of sector management the number of non-groundfish trips, and days absent on non-groundfish trips, has decreased in 2011 (41,753 trips in 2010 vs. 36,386 trips in 2011; 31,552 days absent in 2010 vs. 27,913 days absent in 2011) (Table Table 29). Average trip length on both groundfish and non-groundfish trips were not statistically different during the time series (Table 29).

Table 29 - Effort by Active Vessels

	2007	2008	2009	2010			2011		
				Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
Number of Groundfish Trips	27,004	26,468	26,056	13,441	11,159	2,282	15,929	13,642	2,287
Number of non-groundfish Trips	46,635	46,721	39,943	41,753	16,791	24,962	36,386	17,002	19,384
Number of days absent on groundfish trips	28,158	27,146	24,237	17,614	16,057	1,558	20,724	19,227	1,498
Number of days absent on non-groundfish trips	35,186	36,134	31,241	31,552	15,446	16,106	27,913	14,973	12,940
Average trip length on groundfish trips	7.63	7.82	0.94	1.31	1.44	0.69	1.30	1.41	0.66
(standard deviations)	(6.15)	(5.98)	(1.85)	(2.08)	(2.23)	(0.76)	(2.14)	(2.28)	(0.66)
Average trip length on non-groundfish trips	5.42	4.78	0.84	0.79	0.96	0.68	0.80	0.93	0.69
(standard deviation)	(5.95)	(5.67)	(1.57)	(1.47)	(1.69)	(1.30)	(1.45)	(1.65)	(1.24)

6.5.7 Trends in Fleet Characteristics

The groundfish fishery has traditionally been made up of a diverse fleet, comprised of a range of vessels sizes and gear types. Over the years, as vessels entered and exited the fishery, the "typical" characteristics defining the fleet changed as well. The groundfish fleet is divisible into four "vessel size categories," vessels less than 30 feet in length, vessels between 30 and 50 feet in length, vessels between 50 and 75 feet in length and vessels greater than 75 feet in length. As mentioned above, the number of active vessels in 2011 had declined compared to the previous three years and this decline occurred across all vessel size categories between 2009 and 2011. The number of vessels smaller than 30' has experienced the greatest decline of 32% between 2009 and 2011 (78 to 53 vessels; Table 30). The 30' to < 50' vessel size category, which has the largest number of active vessels, experienced a 16% decline (500 to 419 active vessels) during the past 3 years. Most (229) sector vessels fell into this 30' to 50' size category. The 50' to < 75' vessel size category, containing the second largest number of vessels, experienced an 11% reduction during 2009 to 2011 (247 to 220 active vessels). The 50' to < 75' size category also had the second largest number of sector vessels with 128. The number of active vessels in largest (75' and above) vessel size category declined by 9% between 2009 and 2011. The decline was relatively consistent across all four years in all vessel size categories.

Between the first two years of sector management, the numbers of vessels that joined a sector or stayed in the common pool were about evenly split within size categories with the exception of the largest and smallest categories. For active vessels larger than 75' total length, 67% belong to a sector in 2010 and 69% belong to a sector in 2011. Of active vessels in the smallest size category, those smaller than 30' in length, 84% remained in the common pool in 2010 while 89% of vessels smaller than 30' remained in the common pool in 2011. For active vessels in the 30' to 50' and 50' to 75' range there has been a growing proportion of vessels belonging to sectors. In 2010, active sector vessels comprised 47% and 54% of the 30' to 50' and 50' to 75' ranges respectively. By 2011, those proportions had increased to 55% and 58% of active sector vessels in the 30' to 50' and 50' to 75' ranges.

Table 30 - Vessel activity by size class

				2010			2011		
Vessel size	**2007**	**2008**	**2009**	**Total**	**Sector Vessels**	**Common Pool**	**Total**	**Sector Vessels**	**Common Pool**
Vessels with landings from any species									
Less than 30	83	77	78	70	11	59	53	6	47
30 to < 50	572	528	500	475	225	250	419	229	190
50 to < 75	289	267	247	231	125	106	220	128	92
75 and above	139	140	132	120	79	41	120	83	37
Total	1082	1012	957	896	440	456	812	446	366
Vessels with at least one groundfish trip									
Less than 30	29	26	33	23	2	21	19	1	18
30 to < 50	351	331	308	241	152	89	220	146	74
50 to < 75	194	175	156	117	88	29	115	92	23
75 and above	84	79	73	64	61	3	68	62	6
Total	658	611	570	445	303	142	422	301	121

Fishing effort, as described by either the number of trips taken or the total number of days absent, varies considerably by vessel size. In 2011 more than two thirds of groundfish trips were made by vessels ranging in size from 30 to 50 feet in total length (Table 31). Compared to 2010, 2011 saw increases in the numbers of groundfish trips and the total number of days absent on groundfish trips across almost all vessel size classes. In percentage terms, the largest increases in groundfish trips and days absent on groundfish trips occurred in the less than 30' vessel size category (100% and 69%, respectively). However, there were only a couple hundred trips per year in this vessel size category. In terms of magnitude, the 30' to < 50' vessel size category had the greatest increases in groundfish trips and days absent (1,874 more groundfish trips and 1,265 more days absent on groundfish trips from 2010 to 2011). The largest vessel class (75' and above) experienced a reduction of 5% in groundfish trips but an 11% increase in days absent on groundfish trips. The 50' to < 75' vessel size category had increases of about 19% in both groundfish trips and days absent on groundfish trips. From 2010- 2011, non-groundfish trips and the number of days absent on non-groundfish trips, has declined for all vessel size classes.

Table 31 - Vessel effort (as measured by number of trips and days absent) by vessel size category

				2010			2011		
Vessel Size	2007	2008	2009	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
Number of groundfish trips									
Less than 30	272	239	435	137	2	135	274	15	259
30 to < 50	18200	18453	19349	9240	7509	1731	11114	9401	1713
50 to < 75	7018	6356	4971	2829	2442	387	3368	3067	301
75 and above	1525	1424	1301	1235	1206	29	1173	1159	14
Total	27015	26472	26056	13441	11159	2282	15929	13642	2287
Number of non-groundfish trips									
Less than 30	2534	2249	1784	1703	370	1333	1372	258	1114
30 to < 50	28892	27586	23216	25204	9678	15526	21585	10443	11142
50 to < 75	11979	12825	12090	12321	5456	6865	10920	5036	5884
75 and above	3248	4073	2853	2523	1287	1236	2507	1264	1243
Total	46653	46733	39943	41751	16791	24960	36384	17001	19383
Number of days absent on groundfish trips									
Less than 30	101	82	160	61	1	60	103	7	96
30 to < 50	9580	9586	8794	5067	3958	1109	6332	5216	1116
50 to < 75	10701	9857	8278	5656	5305	351	6713	6447	266
75 and above	7750	7582	7006	6831	6792	38	7576	7558	19
Total	28132	27107	24237	17614	16057	1558	20724	19227	1498
Number of days absent on non-groundfish trips									
Less than 30	665	678	573	537	123	414	419	81	337
30 to < 50	11069	10455	8657	9540	3633	5906	8215	3683	4532
50 to < 75	13006	13557	12681	12545	6491	6053	11498	6414	5084
75 and above	10472	11483	9330	8930	5199	3731	7780	4795	2986
Total	35212	36173	31241	31551	15446	16105	27912	14972	12940

6.5.8 Fishing Communities

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

A “fishing community” is defined in the Magnuson-Stevens Act, as amended in 1996, as “a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community” (16 U.S.C. § 1802(17)). Determining which fishing communities are “substantially dependent” on, and “substantially engaged” in, the groundfish fishery can be difficult. In recent amendments to the fishery management plan the council has categorized communities dependent on the groundfish resource into primary and secondary port groups so that community data can be cross-referenced with other demographic information. Appendix B provides descriptions of 24 of the most important communities involved in the multispecies fishery and further descriptions of North East fishing communities in general can be found on North East Fisheries Science Center’s website (http://www.nefsc.noaa.gov/read/socialsci/community_profiles/).

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

6.5.8.1 Vessel Activity

At the state level, Massachusetts has the highest number of active vessels with a limited access groundfish permit. From 2007 to 2011 the total number of active vessels with revenue from any species on all trips declined 26% (1,082 to 805). All states have shown a decline in the number of active vessels since 2007, but the largest percentage decline has occurred in Connecticut where the number of active vessels dropped 39% by 2011 (Table 32). Just over half of the active vessels belonging to a sector have a homeport in Massachusetts (262 vessels), while New Jersey and Connecticut are the two states in the North East with the fewest vessels belonging to a sector. At the level of home port, there is even greater variation between the ports with regard to the numbers of active vessels.

Table 32 - Number of Active Vessels with Revenue from any Species (all trips) by Home Port and State

				Year					
				2010			2011		
Home Port State/City	2007	2008	2009	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
CT	18	13	13	12	4	8	11	4	7
MA	544	502	482	444	264	183	396	262	134
BOSTON	80	69	67	57	41	16	53	41	12
CHATHAM	46	41	42	43	31	12	39	28	11
GLOUCESTER	124	116	115	109	70	39	95	68	27
NEW BEDFORD	93	91	87	69	48	22	70	53	17
ME	128	116	114	103	63	40	88	70	20
PORTLAND	22	18	17	17	15	2	16	15	1
NH	70	65	62	57	37	22	52	34	20
NJ	67	71	63	58	2	56	52	6	46
NY	98	100	97	95	15	80	92	16	76
RI	110	104	95	87	43	45	84	44	41
POINT JUDITH	58	54	50	46	33	14	45	34	12
All Other States	47	41	35	39	13	26	37	14	23
Grand Total	1,082	1,012	957	890	440	456	805	446	366

Massachusetts is also the state with the highest number of active vessels with revenue from at least one groundfish trip. From 2007 to 2011 the total number of active vessels with revenue from at least one groundfish trip declined 36% (658 to 420). While all states showed a decline in the number of vessels making groundfish trips the largest percentage decline (59%: 41 to 17 vessels) occurred in New Jersey (Table 33). Of the sector vessels making groundfish trips in 2011 almost two thirds of them have a homeport in Massachusetts (186 vessels). Again, New Jersey and Connecticut are the two states with the fewest sector vessels making groundfish trips.

Table 33 - Number of Vessels with Revenue from at Least One Groundfish Trip by Home Port and State

		Year								
					2010			2011		
Home Port State/City		2007	2008	2009	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
CT		9	8	8	7	3	4	5	2	3
MA		341	321	312	238	189	49	224	186	38
	BOSTON	54	49	46	35	33	2	34	34	0
	CHATHAM	26	27	28	26	23	3	26	23	3
	GLOUCESTER	95	88	98	74	59	15	70	55	15
	NEW BEDFORD	60	62	52	33	29	4	37	32	5
ME		78	69	65	43	38	5	47	43	4
	PORTLAND	20	16	15	15	14	1	15	15	0
NH		44	42	42	32	26	6	29	23	6
NJ		41	34	26	21	1	20	17	1	16
NY		52	56	47	40	8	32	43	9	34
RI		78	70	60	55	34	21	49	32	17
	POINT JUDITH	43	36	32	31	28	3	28	27	1
All Other States		15	11	12	10	5	5	8	5	3
Grand Total		658	611	570	445	303	142	420	301	121

6.5.8.2 Employment

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

Throughout the Northeast, many communities benefit indirectly from the multispecies fishery but these benefits are often difficult to attribute. The direct benefit from employment in the fishery can be estimated by the number of crew positions. However, crew positions do not equate to the number of jobs in the fishery and do not make the distinction between full and part-time positions. Crew positions are measured by summing the average crew size of all active vessels on all trips. In 2011 vessels with limited access groundfish permits provided 2,129 crew positions with about half coming from vessels with home ports in Massachusetts. Since 2007, the total number of crew positions provided by limited access groundfish vessels has declined by 21% (2,687 positions to 2129). Declines in crew positions vary across home port states with some states adding crew positions in 2011 (Table 34). Vessels with a home port in Connecticut and New Hampshire have experienced the largest percentage decline (20%: 52 to 41 crew positions in CT and 28%: 139 to 100 crew positions in NH), while vessels home ported in New York have shown an increase in crew positions (3%: 204 to 211 crew positions). All other home port states had crew position reductions ranging from 10 to 18% between 2007 and 2011 (Table 34).

Table 34 - Number of Crew Positions and Crew-Days on Active Vessels by Home Port and State

		Year				
Home Port State		**2007**	**2008**	**2009**	**2010**	**2011**
CT						
	Total CREW POSITIONS	52	39	38	39	41
	Total CREW-DAYS	4,261	3,779	3,317	3,614	3,067
MA						
	Total CREW POSITIONS	1,402	1,311	1,152	1,104	1,063
	Total CREW-DAYS	98,094	93,182	86,234	77,422	82,238
ME						
	Total CREW POSITIONS	276	250	216	220	204
	Total CREW-DAYS	17,872	15,882	14,414	14,427	14,148
NH						
	Total CREW POSITIONS	139	123	114	109	100
	Total CREW-DAYS	6,443	6,135	5,925	3,813	4,663
NJ						
	Total CREW POSITIONS	167	185	159	140	143
	Total CREW-DAYS	12,035	12,987	10,708	9,801	9,364
NY						
	Total CREW POSITIONS	204	214	205	201	211
	Total CREW-DAYS	16,656	15,975	15,479	15,020	15,439
RI						
	Total CREW POSITIONS	304	281	253	243	238
	Total CREW-DAYS	32,072	29,690	24,167	25,454	24,938
OTHER NORTHEAST	Total CREW POSITIONS	145	144	123	133	128
	Total CREW-DAYS	12,158	14,794	12,166	11,626	11,767
Total						
	Total CREW POSITIONS	2,687	2,545	2,260	2,190	2,129
	Total CREW-DAYS	199,593	192,423	172,410	161,178	165,624

A crew day is another measure of employment opportunity that incorporates information about the time spent at sea earning a share of the revenue. Similar to a “man-hour” this measure is calculated by multiplying a vessel’s crew size by the days absent from port, and since the number of trips affects the crew-days indicator, the indicator is also a measure of work opportunity. Conversely, crew days can be viewed as an indicator of time invested in the pursuit of “crew share” (the share of trip revenues received at the end of a trip). The time spent at sea has an opportunity cost. For example if crew earnings remain constant, a decline in crew days would reveal a benefit to crew in that less time was forgone for the same amount of earnings.

In 2011 vessels with limited access groundfish permits used 165,624 crew days with close to half coming from vessels with home ports in Massachusetts. Since 2007 the total number of crew days used by limited access groundfish vessels has declined by 17% (199,593 to 165,624 crew days). Declines in crew days occurred across all home port states, but since 2010 some states have experienced some small increases in the number of crew days (Table 34). Vessels with a home port in New Hampshire experienced the largest percentage decline in crew days (28%: 6,443 to 4,663 crew days), while vessels home ported in states other than CT, MA, ME, NH, NJ, NY, and RI had the lowest percentage decline (3%: 12,158 to 11,767 crew days). All other home port states had crew position reductions ranging from 10% to 17% between 2007 and 2011 (Table 34).

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

6.5.8.3 Consolidation and Redirection

The multiple regulatory constraints placed on common pool groundfishermen 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 in previous years, 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 United States (U.S.) 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 and 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 and Edwards 2009).

The scope of consolidation and redirection of effort that may be expected to result from sector operations in FY 2013 is difficult to predict. Data is now available for the first two years of expanded sector operations, FY 2010 and FY 2011, which is discussed above. In addition, the activities of FY 2012 sectors and individual sector's predictions for expected consolidation in FY 2013 are discussed further in Section 1.1.3.

6.5.8.4 Overview of the Ports for FY 2013 Sectors

Sector fishermen would utilize ports throughout the Middle Atlantic and New England. The sector operations plans listed home ports and landing ports that the sectors plan to use in FY 2013. The following table (Table 35) summarizes these ports.

Table 35 - Home Ports and Landing Ports for Sector Fishermen in FY 2013 (As reported by sectors in their FY 2013 operations plans)

State	Primary Ports[a]		Other Ports[b]	
Connecticut:	N/A		New London, Stonington	
Massachusetts	Boston	New Bedford	Barnstable	Provincetown
	Chatham	Newburyport	Dennis	
	Gloucester	Plymouth	Hyannis	
	Harwich	Rockport	Nantucket	
	Marshfield	Sandwich		
	Menemsha	Situate		
Maine	Boothbay Harbor		Bar Harbor	Saco
	Harpswell		Five Islands	South Bristol
	(Cundy's Harbor)		Jonesport	Southwest Harbor
	Kennebunkport		Phippsburg (Sebasco Harbor)	Stonington
	Port Clyde			Tenant's Harbor
	Portland		Rockland	Tremont (Bass Harbor)
				Winter Harbor
New Hampshire	Portsmouth		N/A	
	Rye			
	Seabrook			
New Jersey	N/A		Barnegut Light	
			Cape May	
			Point Pleasant	
New York	Montauk		Hampton Bays- Shinnecock	
			Greenport	
Rhode Island	Point Judith		N/A	
	Newport			
Virginia	N/A		Chincoteague, Greenbackville	

Notes:

[a] Listed by one or more sector as a primary port in their FY 2013 operations plans. A primary port refers to those ports used to land the majority of catch from active sector vessels or where the majority of sector vessels are home ported.

[b] Includes those ports listed by one or more sector as a secondary port but not a primary port. The other ports category includes all remaining ports that may be used by sector vessels.

6.5.9 FY 2011 Regulated Groundfish Stock Catches

The Northeast Multispecies FMP specifies Annual Catch Limits (ACLs) for twenty stocks. Exceeding the ACL 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 36 through Table 39 compare FY 2011 catches to ACLs. This reconciliation was provided by NERO, and includes imputation for missing dealer records. As shown in Table 37, catches exceed ACLs for only two stocks: GOM/GB windowpane flounder and SNE/MA windowpane flounder. ACLs for these two stocks were also exceeded in FY 2010. AMs for those stocks were modified in FW 47 but have not yet been implemented.

Table 38 summarizes catches by non-groundfish components of the ACLs. Assignment of catches to a specific FMP is difficult unless the FMP uses a specific gear (e.g. the scallop fishery) or has a trip activity declaration (e.g. groundfish and monkfish trips). For this reason the assignment of catch to FMP should be viewed with caution. Nevertheless, this table indicates that much of the catch of SNE/MAB windowpane flounder is taken outside the groundfish fishery. The squid/whiting fishery on GB also catches a substantial amount of GB yellowtail flounder, particularly when compared to possible future quotas.

Because of difficulty in assigning catch to a specific FMP, catches of SNE/MA windowpane flounder were allocated by trawl gear mesh size (Table 39 and Table 40). As can be seen from these tables, large mesh bottom trawls (mesh size 5 inches and larger) account for a large part of the non-groundfish catch.

Table 36 – FY2011 catches of regulated groundfish stocks (metric tons, live weight)

Stock	Components with ACLs and sub-ACLs; (with accountability measures (AMs))							sub-components: No AMs	
	Total Groundfish	Groundfish Fishery	Sector	Common Pool	Recreational*	Midwater Trawl Herring Fishery**	Scallop Fishery	State Water	Other
	A to G	A+B+C	A	B	C	D	E	F	G
GB cod	3,405.9	3,276.7	3,215.3	61.5				38.9	90.2
GOM cod	6,347.1	6,101.8	4,368.0	93.4	1,640.3			216.4	28.8
GB Haddock	4,252.0	3,840.5	3,828.8	11.7		101.8		3.9	305.8
GOM Haddock	737.6	724.1	483.7	1.9	238.5	0.2		4.9	8.4
GB Yellowtail Flounder	1,117.0	990.0	988.0	2.0			83.9	0.0	43.2
SNE/MA Yellowtail Flounder	514.9	376.2	364.0	12.2			110.9	1.1	26.7
CC/GOM Yellowtail Flounder	853.1	806.5	795.1	11.4				38.5	8.1
Plaice	1,660.7	1,636.1	1,631.6	4.5				12.1	12.6
Witch Flounder	1,186.0	997.1	992.9	4.2				22.5	166.4
GB Winter Flounder	1,984.8	1,925.4	1,924.2	1.1				0.0	59.4
GOM Winter Flounder	287.3	160.8	158.2	2.6				113.3	13.2
SNE/MA Winter Flounder	298.7	93.9	86.9	7.0				40.0	164.9
Redfish	2,720.6	2,706.7	2,703.2	3.6				3.6	10.2
White Hake	3,035.5	3,028.5	3,014.4	14.1				2.6	4.4
Pollock	9,064.0	7,612.4	7,543.1	69.2				694.0	757.6
Northern Windowpane	191.3	156.5	156.2	0.3				0.0	34.8
Southern Windowpane	504.1	111.5	83.0	28.5				16.6	376.0
Ocean Pout	90.2	60.7	56.3	4.4				0.0	29.5
Halibut	52.1	42.6	41.4	1.2				7.1	2.5
Wolffish	33.0	32.9	32.2	0.7				0.0	0.1

[1]Catch includes any FY 2010 carryover caught by sectors in FY 2011.

Any value for a non-allocated species may include landings of that stock;

*Recreational estimates based on Marine Recreational Information Program (MRIP) data.

**Landings extrapolated from observer data.

misreporting of species and/or stock area; and/or estimated landings (in lieu of missing reports) based on vessel histories.

Table 37 - FY 2011catches as percent of ACL

Stock	Components with ACLs and sub-ACLs; (with accountability measures (AMs))							sub-components: No AMs	
	Total Groundfish*	Groundfish Fishery*	Sector*	Common Pool	Recreational**	Midwater Trawl Herring Fishery	Scallop Fishery	State Water	Other
GB cod	68.0	68.8	68.9	66.1				81.1	47.2
GOM cod	69.2	74.1	83.4	89.9	58.1			36.3	9.6
GB Haddock	1.3	-	0.0	6.3		32.0		1.1	22.3
GOM Haddock	57.7	59.4	52.6	24.3	77.4	1.7		54.6	24.1
GB Yellowtail Flounder	78.9	86.7	88.1	10.1			41.8	NA	59.1
SNE Yellowtail Flounder	76.7	67.3	84.3	10.2			135.2	15.6	98.9
CC/GOM Yellowtail Flounder	78.9	78.3	79.4	42.1				384.8	19.3
Plaice	42.3	43.8	44.7	6.4				35.5	9.1
Witch Flounder	84.8	74.1	75.3	16.8				161.0	302.5
GB Winter Flounder	85.1	86.9	87.4	8.2				NA	53.5
GOM Winter Flounder	52.4	45.0	46.5	16.5				69.5	41.3
SNE/MA Winter Flounder	35.5	12.9	NA	NA				55.6	366.4
Redfish	25.7	26.9	27.0	9.9				4.3	3.1
White Hake	88.9	93.5	93.9	50.4				7.9	3.3
Pollock	46.1	43.0	42.8	66.6				90.3	52.4
Northern Windowpane	118.8	142.2	NA	NA				0.5	71.0
Southern Windowpane	224.0	72.4	NA	NA				829.1	544.9
Ocean Pout	35.7	25.4	NA	NA				0.0	268.5
Halibut	68.6	129.1	NA	NA				18.1	61.6
Wolffish	42.8	45.1	NA	NA				0.0	2.4

* The percent of the FY 2011 catch limits caught does not include any FY 2010 carryover caught by sectors in FY 2011. FY 2010 carryover caught is not applied

to the FY 2011 ACL.

** To evaluate whether recreational catches exceeded any of the recreational sub-ACLs, and determine whether a recreational AM was triggered, the 2-year average of FY 2010 and FY 2011 was used.

Table 38 – FY 2011 catches by non-groundfish FMPs

Stock	Total	SCALLOP[1]	FLUKE	HAGFISH	HERRING	'LOBSTER/ CRAB'	MENHADEN	MONKFISH	REDCRAB	RESEARCH
GB cod	90.2	5.7	0.6	0.0	0.3	0.7	0.1	0.1	0.0	12.3
GOM cod	28.8	-	0.6	0.0	2.9	0.1	0.0	0.0	-	8.7
GB Haddock	305.8	2.4	8.2	-	14.4**	2.3	-	0.1	-	18.1
GOM Haddock	8.4	-	0.0	0.0	2.6**	0.1	-	-	-	0.2
GBYellowtail Flounder	43.2	-**	0.1	0.0	1.0	0.0	-	0.0	0.0	-
SNEYellowtail Flounder	26.7	-**	8.5	-	0.1	0.0	0.0	0.1	0.0	3.4
CC/GOMYellowtail Flounder	8.1	2.9	0.1	0.0	0.5	0.0	0.0	0.0	-	2.5
Plaice	12.6	0.0	1.3	0.0	1.4	0.5	0.3	0.0	0.0	1.5
Witch Flounder	166.4	18.0	19.5	0.0	7.2	1.5	0.4	0.2	0.0	1.1
GB Winter Flounder	59.4	38.4	0.3	-	0.4	0.0	-	-	-	-
GOM Winter Flounder	13.2	2.0	0.0	0.0	0.2	0.0	-	-	-	0.2
SNE Winter Flounder	164.9	60.3	16.4	0.0	2.6	0.6	0.0	0.2	0.0	3.5
Redfish	10.2	0.0	3.1	0.0	0.2	0.1	0.0	0.0	0.0	0.1
White Hake	4.4	2.0	0.4	0.0	0.0	0.1	0.0	0.6	0.0	0.0
Pollock	757.6	-	0.8	0.0	0.5	0.2	0.1	0.0	0.0	0.6
Northern Windowpane	34.8	33.0	0.0	0.0	0.2	0.0	-	0.0	0.0	0.0
Southern Windowpane	376.0	135.3	75.9	-	1.6	0.6	0.1	0.6	0.0	0.0
Ocean Pout	29.5	6.4	6.5	0.0	0.4	0.1	0.0	0.0	0.0	0.0
Halibut	2.5	0.8	0.1	-	0.1	0.4	-	0.0	-	0.0
Wolffish	0.1	-	0.0	-	-	-	-	-	-	-

Values in metric tons of live weight

[1]Based on scallop fishing year March, 2011 through February, 2012

*Estimates not applicable. Recreational amounts are not attributed to the ACL consistent with the assessments for these stocks used to set FY 2011 quotas.

Table 38 – FY 2011 catches by non-groundfish FMPs (cont.)

Stock	SCUP	SHRIMP	SQUID	'SQUID/ WHITING'	SURFCLAM	TILEFISH	'WHELK/CONCH'	WHITING	UNKNOWN	REC
GB cod	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.0	15.2	54.6
GOM cod	2.5	0.7	0.4	3.1	0.0	-	0.0	2.6	7.3	-**
GB Haddock	5.5	0.1	98.8	52.0	-	-	-	0.9	102.9	NA*
GOM Haddock	-	0.5	0.0	0.8	-	-	0.0	1.9	2.4	-**
GBYellowtail Flounder	0.2	0.0	0.2	40.7	-	-	0.0	-	1.0	
SNEYellowtail Flounder	4.5	0.0	1.2	1.2	0.0	0.0	0.0	0.0	7.7	
CC/GOMYellowtail Flounder	0.3	0.1	0.0	0.4	0.0	-	0.0	0.3	0.9	
Plaice	0.8	0.0	2.1	1.3	0.0	0.0	0.0	0.0	3.2	
Witch Flounder	13.0	0.2	35.3	20.7	0.0	0.0	0.1	0.8	48.3	
GB Winter Flounder	1.2	0.0	0.2	16.7	-	-	-	0.1	2.2	
GOM Winter Flounder	-	0.0	0.0	0.1	-	-	0.0	0.2	0.2	10.3
SNE Winter Flounder	8.3	0.0	19.5	6.8	0.0	0.0	0.0	0.1	34.9	11.7
Redfish	2.1	0.0	0.9	0.8	0.0	0.0	0.0	0.0	2.9	
White Hake	0.4	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.6	
Pollock	0.5	0.0	0.1	0.1	0.0	0.0	0.0	0.0	6.1	748.5
Northern Windowpane	0.0	0.0	0.0	1.4	0.0	-	0.0	0.1	0.1	
Southern Windowpane	48.7	0.0	17.8	14.9	0.0	0.0	0.0	0.1	80.5	
Ocean Pout	4.4	0.0	2.7	2.1	0.0	0.0	0.0	0.1	6.9	
Halibut	0.1	0.0	0.3	0.2	-	-	-	0.0	0.5	
Wolffish	-	-	-	-	-	-	-	-	0.1	

Table 39 – FY 2010 SNE/MA windowpane flounder catch by trawl gear mesh size

SECGEARFISH	ROUNDED_MESH	SPPNM	Windowpane Discarded (mt)	TRIP_COUNT	Total and Top Three Species Landed (mt)
OTF	<=4.5	TOTAL	12.4	6,543	43,954.4
OTF	<=4.5	SQUID (ILLEX)	5.2	338	16,675.1
OTF	<=4.5	SQUID (LOLIGO)	2.6	4,612	8,884.4
OTF	<=4.5	HERRING, ATLANTIC	1.5	642	4,814.9
OTF	5	TOTAL	39.6	905	2,603.6
OTF	5	SCUP	22.8	809	1,510.5
OTF	5	MENHADEN	2.8	9	184.3
OTF	5	FLOUNDER, SUMMER	2.7	797	177.5
OTF	5.5	TOTAL	90.0	2,321	5,867.7
OTF	5.5	FLOUNDER, SUMMER	48.5	2,252	3,169.9
OTF	5.5	SCUP	13.5	849	879.3
OTF	5.5	SKATES	3.9	820	253.9
OTF	6	TOTAL	48.4	2,203	3,219.9
OTF	6	FLOUNDER, SUMMER	18.0	2,121	1,184.2
OTF	6	SKATES	10.0	773	660.4
OTF	6	SCUP	6.6	1,038	433.1
OTF	6.5	TOTAL	52.7	2,868	3,509.6
OTF	6.5	SKATES	28.8	1,364	1,907.8
OTF	6.5	FLOUNDER, SUMMER	12.9	2,626	841.0
OTF	6.5	SCUP	4.5	1,713	291.9
OTF	>6.5	TOTAL	1.2	81	75.6
OTF	>6.5	SQUID (LOLIGO)	0.3	19	19.3
OTF	>6.5	SKATES	0.2	30	16.1
OTF	>6.5	FLOUNDER, SUMMER	0.2	59	10.4
OTF	TOTAL	TOTAL	244.3	14,387	59,230.7
		TOTAL NON-SCALLOP	244.5		
		SCALLOP	177.8		
		GRAND TOTAL	422.3		

Table 40 – FY 2011 SNE/MA windowpane flounder catch by trawl gear mesh size

SECGEARFISH	ROUNDED_MESH	SPPNM	Windowpane Discarded (mt)	TRIP_ COUNT	Total and Top Three Species Landed (mt)
OTF	<=4.5	TOTAL	27.3	5,564	45,081.9
OTF	<=4.5	SQUID (ILLEX)	12.5	348	18,663.0
OTF	<=4.5	SQUID (LOLIGO)	5.1	4,281	7,796.0
OTF	<=4.5	HERRING, ATLANTIC	3.4	578	5,131.3
OTF	5	TOTAL	41.1	1,122	3,351.8
OTF	5	SCUP	26.5	1,015	2,152.5
OTF	5	HAKE, SILVER	3.2	742	263.1
OTF	5	FLOUNDER, SUMMER	2.4	1,037	197.2
OTF	5.5	TOTAL	65.7	2,606	5,364.0
OTF	5.5	FLOUNDER, SUMMER	30.3	2,503	2,464.8
OTF	5.5	SCUP	14.7	995	1,192.5
OTF	5.5	SKATES	3.7	1,117	302.0
OTF	6	TOTAL	31.8	2,158	2,618.9
OTF	6	FLOUNDER, SUMMER	11.1	2,120	904.8
OTF	6	SKATES	10.2	906	832.9
OTF	6	SCUP	4.1	965	346.0
OTF	6.5	TOTAL	50.0	3,074	4,120.2
OTF	6.5	SKATES	26.2	1,461	2,177.7
OTF	6.5	FLOUNDER, SUMMER	9.0	2,873	728.3
OTF	6.5	SCUP	5.5	1,835	443.4
OTF	>6.5	TOTAL	1.4	58	117.7
OTF	>6.5	SKATES	0.5	33	44.5
OTF	>6.5	SQUID (LOLIGO)	0.3	25	21.5
OTF	>6.5	CROAKER, ATLANTIC	0.3	5	21.2
OTF	TOTAL	TOTAL OTTER TRAWL	217.4	13,972	60,654.5
		TOTAL NON-SCALLOP	217.9	180,938	245,079.7
		SCALLOP	135.3		
		GRAND TOTAL	353.1		

6.5.10 Introduction to Sector Data

FY 2010 marked the first year that the sector program landed the overwhelming majority of the groundfish ACL. This document includes sector data from FY 2010 and FY 2011. Data from FY 2009 is also included for vessels that were sector members in FY 2010. This approach informs the analysis and provides a baseline for the public to better understand the operation of the sector fishery. Some differences in totals between the 2009-2010 analysis and the current analysis may be noted for 2009 and 2010. These are due to updates to the source data (VTR database and Data Matching and Imputation database (DMIS)) as well a minor modification to the sector membership algorithm. Sector membership is now based on MRI rather than vessel permit number. The reason for this is that the MRIs within a sector do not change during the fishing year, whereas a vessel permit may move into or out of a sector (although this is rare). Hence, MRI is a more reliable means of tracking sector membership.

For the purpose of this EA, and for the management of the sector fishery, the Northeast Regional Office defines a "groundfish trip," as a sector trip where groundfish is landed, and applied to a sector ACE. This definition differs from other methods of defining a groundfish trip. Other methodologies use a sector VMS declaration to define a groundfish trip regardless of whether groundfish was landed and applied to a sector ACE. Unless stated otherwise, NMFS compiled most of the gear and/or location-specific data presented in this section, and elsewhere in the document from vessel trip reports (VTR). The Northeast Regional Office used VTR data because it contains effort data, and gear and positional information. NMFS took some of the data in the document, such as that concerning protected resources, from the Northeast fisheries observer data set. It is important that the reader be informed that there are different sources of fishery data (i.e., observer, self-reported, dealer, etc.), and the data used in this EA may be different than data published from other sources, such as reports from the Northeast Fishery Science Center, and from data published for other uses.

The EA analysis uses complete data sources. As such, we excluded trips with undefined gear, missing land dates, missing sector membership, and trips that did not submit a VTR. Such records may be included in other groundfish trip analysis and reports, but detailed trip data is required for the purpose of this EA. Total trip counts and catch counts in the EA may differ when comparing to the sector data available to the public on the NMFS website. Reasons for this difference include the following:

- The EA analyses use VTR and observer data (rationale explained above). The data on the sector website is from VMS, VTR, and dealer data. Therefore, a trip that was reported by a dealer, but which has no corresponding VTR, is displayed on the website, but not in the EA. Likewise, a trip that is reported only on the VMS declaration will be counted on the website, but is not included in the EA. This is the major source of trip count differences.

- The EA uses data from two years. The primary purpose of quota monitoring is to determine the ACE as accurately as possible. Because of this difference in purpose, NMFS matches trips between multiple data sources to account for misreporting. The EA has two data sources but uses them in separate analyses, thus it does not need to perform trip matching. Trip matching can have small effects on trip counts.

- Catch weights will differ between the EA and other publically available sector data because the EA uses landed weight, as estimated by fishermen and reported on the VTR, whereas NMFS reports dealer live weight on their website.

6.5.10.1 Annual Catch Entitlement Comparison

Each sector receives a total amount (in pounds) of fish it can harvest for each stock. This amount is the sector's Annual Catch Entitlement (ACE). 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 to get the sector's ACE. Since the annual ACE is dependent on the amount of the ACL for a given fishing year, the ACE may be higher or lower from year to year even if the sector's membership remained the same. As seen in Table 41, there are substantial shifts in ACE for various stocks between FY 2009 and FY 2012. As seen in the below data, there has been a general decrease in trips, and catch for sector vessels. In addition, 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.

Table 41 - Commercial Groundfish Sub ACL FY 2009 to FY 2012

Groundfish Stock	FY 2009 target/hard TAC (lbs)	FY 2010 ACL (lbs)	% Change 2009 to 2010	FY 2011 ACL (lbs)	% Change 2010 to 2011	FY 2012 ACL (lbs)	% Change 2011 to 2012
Witch Flounder	2,489,019	1,878,338	-24.53%	2,724,914	45.07%	3,192,294	8.34%
White Hake	5,238,183	5,635,015	7.58%	6,556,548	16.35%	7,237,776	10.39%
SNE/MA Yellowtail Flounder	857,598	683,433	-20.31%	1,155,222	69.03%	1,675,513	45.04%
Redfish	18,990,619	15,092,846	-20.52%	16,625,059	10.15%	18,653,483	10.40
Pollock	13,990,535	36,493,118	160.84%	30,758,895	-15.71%	27,804,700	-9.60%
Plaice	7,085,657	6,278,765	-11.39%	6,851,967	9.13%	7,226,753	5.47%
GOM Winter Flounder	835,552	348,330	-58.31%	348,330	0.00%	1,576,305	352.53%
GOM Haddock	3,448,030	1,818,814	-47.25%	1,715,196	-5.70%	1,439,619	-16.07
GOM Cod	23,642,373	10,068,512	-57.41%	10,637,304	5.65%	4,310,037	-59.48%
GB Yellowtail Flounder	3,564,875	1,814,404	-49.10%	2,517,679	38.76%	479,946	80.94%
GB Winter Flounder	4,418,064	4,082,961	-7.58%	4,424,678	8.37%	7,467,057	68.76%
GB Haddock West	171,861,356	62,725,923	-63.50%	46,164,798	-26.40%	45,322,632	-1.82%
GB Haddock East	24,471,311	26,429,016	8.00%	21,252,562	-19.59%	15,167,804	-28.63%
GB Cod West	10,965,793	6,816,693	-37.84%	9,041,157	32.63%	9,795,138	8.34%
GB Cod East	1,161,836	745,162	-35.86%	440,925	-40.83%	357,149	-19.00%
CC/GOM Yellowtail Flounder	1,895,975	1,717,401	-9.42%	2,072,345	20.67%	2,306,035	11.28%
Totals	294,916,777	182,628,733	-38.07%	163,287,579	-10.59%	153,712,242	-5.86%

Table 42 - Overfishing Limit, Acceptable Biological Catch and sub-ACLs for multispecies

Stock	OFL	U.S. ABC	Components with ACLs and sub-ACLs; (with accountability measures (AMs))							sub-components: No AMs	
			Total ACL	Groundfish sub-ACL	Sector sub-ACL	Common Pool sub-ACL	Recreational sub-ACL	Midwater Trawl Herring Fishery sub-ACL	Scallop Fishery sub-ACL	State Water	Other
			A to G	A+B+C	A	B	C	D	E	F	G
GB cod	7,311	4,766	4,540	4,301	4,208	93				48	191
GOM cod	11,715	9,012	8,545	7,649	4,721	104	2,824			597	299
GB Haddock	59,948	34,244	32,611	30,580	30,393	187		318		342	1,370
GOM Haddock	1,536	1,206	1,141	1,086	770	8	308	11		9	35
GB Yellowtail Flounder	3,495	1,458	1,416	1,142	1,122	20			200.8	0	73
SNE Yellowtail Flounder	2,174	687	641	524	404	120			82	7	27
CC/GOM Yellowtail Flounder	1,355	1,041	992	940	913	27				10	42
Plaice	4,483	3,444	3,280	3,108	3,038	70				34	138
Witch Flounder	1,792	1,369	1,304	1,236	1,211	25				14	55
GB Winter Flounder	2,886	2,224	2,118	2,007	1,993	14				0	111
GOM Winter Flounder	1,458	1,078	524	329	313	16				163	32
SNE/MA Winter Flounder	2,117	897	842	726	NA	726				72	45
Redfish	10,903	8,356	7,959	7,541	7,505	36				84	334
White Hake	4,805	3,295	3,138	2,974	2,946	28				33	132
Pollock	21,853	16,900	16,166	13,952	13,848	104				769	1,445
Northern	225	169	161	110	NA	110				2	49

Windowpane											
Southern Windowpane	317	237	225	154	NA	154				2	69
Ocean Pout	361	271	253	239	NA	239				3	11
Halibut	130	78	76	33	NA	33				39	4
Wolffish	92	83	77	73	NA	73				1	3

6.5.11 Common Pool Groundfish Fishing Activity

With the adoption of Amendment 16 in 2010, most groundfish fishing activity occurs under sector management regulations. There are, however, a few vessels that are not members of 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 FY 2011 (Figure 26). The largest common pool catch (GOM cod, 93 mt) was only 2 percent of the total groundfish fishery catch of this stock. Common pool vessels caught about 7 percent of the SNE/MA winter flounder groundfish catch, and 3 percent of the SNE/MA yellowtail flounder groundfish fishery catch.

Common pool vessels landed 1.4 million pounds (live weight) of regulated groundfish in FY 2010, worth about $2 million in ex-vessel revenues. Landings declined to 544 thousand pounds worth $814,000 in FY 2011. Most common pool vessel groundfish fishing activity takes place in the state of Massachusetts. From FY 2010 to FY 2011, the activity from Maine ports declined dramatically. The primary ports for this activity are Gloucester, Portland, and New Bedford (Table 48, Table 49, Table 50).

The primary groundfish stocks landed by common pool vessels include GOM cod, GB cod, and pollock (Table 51). GB haddock was an important component in FY 2010 but not in FY 2011. Vessels using HA and HB permits on groundfish trips primarily target GB and COM cod, GOM haddock, and pollock.

For the common pool permits that landed at least one pound of regulated groundfish in either FY 2010 or FY 2011, groundfish revenues were a major portion of revenues on groundfish fishing trips. Groundfish revenues were 80 percent or more of the trip revenues for 49 percent of these vessels; they were 60 percent of the revenues for 61.5 percent of these vessels. Dependence on groundfish was greatest for HA permitted vessels, with 70 percent of these vessels earning all revenues on these trips from regulated groundfish.

6.5.12 At-Sea Monitoring Overview

Amendment 16 adopted additional at-sea monitoring requirements for the groundfish fishery. Data are available that summarize the number of NEFOP and ASM days of coverage, by sector, for FY 2010. Similar data have not been released for FY 2011. Total costs of this program in FY 2010 were $6.3 million, with 8,702 observer seadays funded. The trip based coverage rate by sector varied from 11 percent for the common pool to 82 percent for the Northeast Coastal Communities Sector (this sector had few total trips taken) (Table 43).

The percent of total monitoring costs, by sector, was roughly proportional to the percent of total groundfish discards (Figure 18). If a sector's monitoring costs as a percent of total were the same or almost the same as the percent of groundfish discards, it would be plotted on or near the 1:1 line shown. The percent of monitoring costs for six sectors are lower than the percent of groundfish discards estimated (NESC II, NESC V, NESC VIII, NESC XIII, NESC IX, and common pool). Three of these sectors consist primarily of inshore vessels. The percent of monitoring costs for six sectors are higher than the percent of groundfish discards estimates for those sectors (PCCS, NESC III, NESC XI, NESC X, GBFG, and SHS1). Four of these sectors are primarily inshore vessels.

Observed sea days were generally proportional to the pounds of groundfish caught (Figure 19). Monitoring costs are primarily generated by the number of sea days. While the number of sea days increases with pounds landed, there is some variability at the lower catch levels. There is one group of sectors (highlighted by an oval) that appear to have more sea days than other sectors at similar catch levels. Both sectors in the oval are primarily inshore sectors (GBFG, NESC III). Of the sectors in this oval, one sector where the percent of discards are higher than the percent of landings (GBFG) and one where the percent of discards is lower than the percent of landings (NESC III).

Table 43 – Monitoring costs and catches by sector, FY 2010

	Estimated Coverage	**Number of Seadays**				**Catch**			**Monitoring Cost**
SECTOR	NEFOP+ ASM	NEFOP	ASM	FSB	TOTAL	Landings	Discards	Total	Total
Common Pool - Groundfish	11.4%	94	250	0	344	1,497,294	325,566	1,822,860	$251,610
GB Cod Fixed Gear Sector	32.2%	142	733	0	875	2,135,072	146,336	2,281,408	$623,043
Sustainable Harvest Sector 1	30.8%	550	1467	0	2017	22,670,561	599,709	23,270,270	$1,474,546
Port Clyde Community Groundfish Sector	27.9%	16	243	0	259	1,000,255	35,224	1,035,479	$180,956
Northeast Fishery Sector VII	28.4%	128	256	0	384	2,057,048	123,688	2,180,737	$285,168
Northeast Fishery Sector VIII	24.8%	68	227	7	302	3,069,013	152,992	3,222,005	$212,392
Northeast Fishery Sector XI	28.1%	104	445	1	550	2,879,262	103,313	2,982,575	$394,307
Northeast Fishery Sector XII	34.8%	5	26	0	31	126,155	7,920	134,075	$21,964
Northeast Fishery Sector II	26.9%	239	751	1	991	9,981,597	431,140	10,412,736	$716,417
Northeast Fishery Sector III	25.2%	205	583	0	788	2,650,952	65,872	2,716,824	$573,520
Northeast Fishery Sector X	30.8%	122	188	1	311	846,464	54,447	900,911	$232,194
Northeast Fishery Sector XIII	28.6%	103	310	0	413	3,587,713	197,350	3,785,063	$300,036
Northeast Fishery Sector IX	26.8%	279	462	0	741	8,171,211	496,965	8,668,177	$557,945
Northeast Fishery Sector V	31.4%	131	288	0	419	1,309,850	179,293	1,489,142	$309,655
Tri-State Sector	22.0%	33	42	0	75	656,798	23,020	679,818	$56,773
Northeast Fishery Sector VI	18.8%	44	126	0	170	2,864,288	59,027	2,923,314	$123,635
Northeast Coastal Communities Sector	82.1%	22	1	9	32	7,350	2,579	9,930	$19,252
									$0
TOTAL FOR ALL SECTORS	26.8%	2285	6398	19	8702	64,498,920	2,975,138	67,474,058	$6,333,411

Figure 18 – Percent of monitoring costs and percent of discards

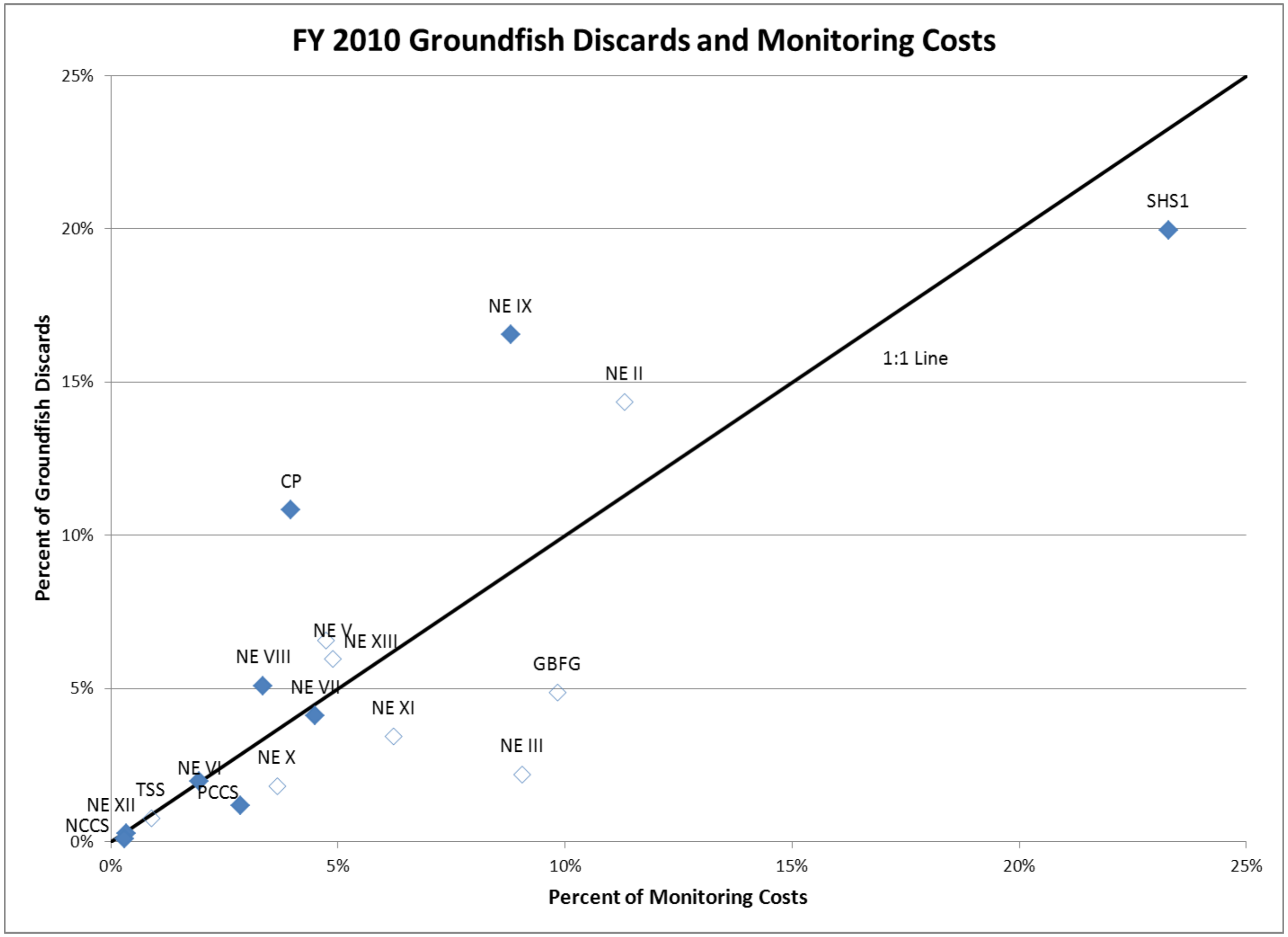
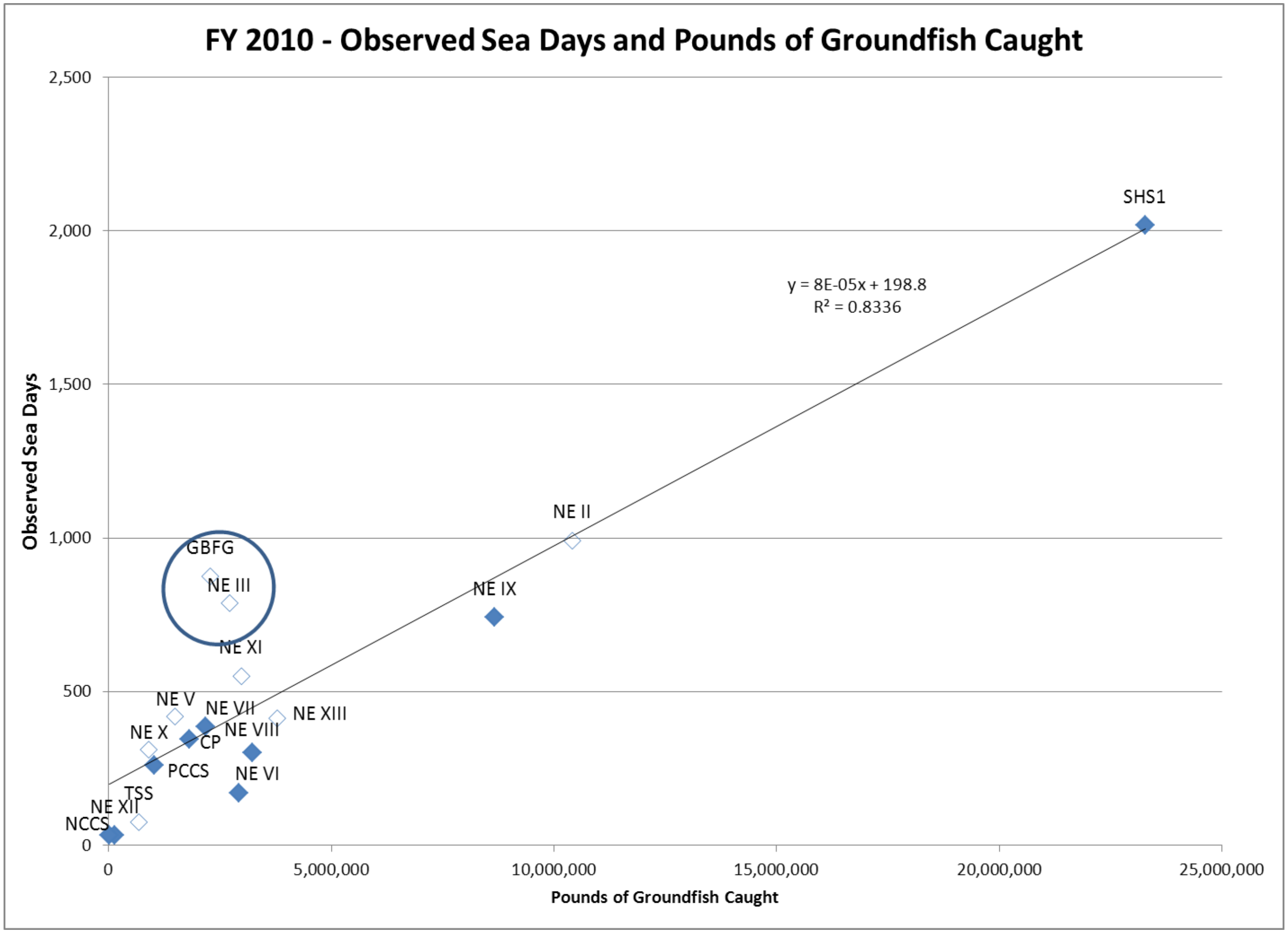


Figure 19 – FY 2010 observed sea days and groundfish pounds caught



6.5.12.1.1 Realized Sector CVs

Amendment 16 adopted ASM requirements of sector and common pool vessels. The amendment included a monitoring standard that sector ASM should be adequate to, at a minimum, achieve the CV standard established by the SBRM. This standard was at 30 percent when Amendment 16 was adopted. A legal challenge to the SBRM resulted in the SBRM amendment being nullified so the status of the Amendment 16 requirement is uncertain. The amendment was not clear on the application of this standard. Depending on the level of stratification that must meet the CV, the number of observed trips needed to meet the standard can increase or decrease. This section summarizes the realized CVs for FY 2010 and FY 2011 at two different levels. The first level is at the aggregated stock level. The second level is at the sector/stock level.

Table 44 and Table 45 summarize discards, sub-trips, observer coverage, realized stock CVs, and percent coverage required to meet the CV standard at that aggregated stock level. Note that sub-trips do not equal the total number of actual trips and the way this table is constructed there is double-counting of sub-trips (e.g. a trip targeting GB cod and GB haddock is summarized twice in the table). At this level, the CV standard of 30 percent was met for all stocks in both FY 2010 and 2011. For most stocks, about 30 percent of sub-trips were observed in FY 2010 and about 26 percent of sub-trips were observed in FY 2011. In both years the coverage level was more than needed to meet the CV standard. This calculation is based on the precision of the discard estimate alone, and does not consider the possibility of monitoring effects or bias in discard estimates. The slight reduction in coverage from FY 2010 to FY 2011 did not result in wholesale increases in the CV: CVs increased for nine stocks and decreased for thirteen. Only the CV for GB winter flounder in FY 2011 was close to the standard.

At the sector and stock level there were many instances where the CV exceeded 30 percent. These are highlighted in Table 46 and Table 47. In most cases, the CVs above 30 percent are associated with small amounts of estimated discards. This is illustrated by Figure 20 and Figure 21. These Tables plot each sector/stock specific CV against the associated discard estimate. In each year, all but one of the CVs above 30 percent were associated with discards of less than 20,000 pounds.

Table 44 – FY 2010 Discards and CVs for sectors

Stock	Discards (lbs)	Number of strata sub-trips	Number observed sub-trips	Percent sub-trips observed	Realized stock CV	Percent observer coverage required for CV30
GB Cod East	33,664	463	132	28.51	13.28	7.34
GB Cod West	228,695	5,195	1,732	33.34	6.4	2.23
GOM Cod	177,643	7,585	2,644	34.86	5.47	1.75
Plaice	391,821	13,211	4,178	31.63	4.79	1.17
GB Winter Flounder	41,798	1,612	420	26.05	15.73	8.87
GOM Winter Flounder	3,526	7,585	2,644	34.86	10.31	5.95
Witch Flounder	130,375	13,211	4,178	31.63	5.33	1.44
CC/GOM Yellowtail Flounder	134,063	10,203	3,526	34.56	7.93	3.56
GB Yellowtail Flounder	148,644	1,612	420	26.05	10.3	4.03
SNE/MA Yellowtail Flounder	9,409	1,395	427	30.61	12.97	7.67
GB Haddock East	36,004	463	132	28.51	12.35	6.48
GB Haddock West	50,051	5,195	1,732	33.34	14.85	10.93
GOM Haddock	5,798	7,585	2,644	34.86	10.84	6.54
White Hake	71,276	13,211	4,178	31.63	8.79	3.82
Pollock	171,801	13,211	4,178	31.63	9.81	4.72
Redfish	341,123	13,211	4,178	31.63	11.94	6.83
SNE/MA Winter Flounder	73,787	4,031	1,513	37.53	7.75	3.87
Southern Windowpane	110,095	1,395	427	30.61	8.8	3.73
Northern Windowpane	345,804	11,817	3,768	31.89	11.17	6.1
Ocean Pout	126,770	13,211	4,178	31.63	9.23	4.19
Halibut	44,370	13,211	4,178	31.63	5.3	1.42
Wolffish	42,836	13,211	4,178	31.63	6.45	2.1

Table 45 – FY 2011 Discards and CVs for sectors

Stock	Discards (lbs)	Number of strata sub-trips	Number observed sub-trips	Percent sub-trips observed	Realized stock CV	Percent observer coverage required for CV30
GB Cod East	73,475	481	152	31.6	13.95	9.15
GB Cod West	251,340	6,230	1,694	27.19	9.92	3.93
GOM Cod	322,451	10,320	2,986	28.93	4.6	0.95
Plaice	443,138	17,020	4,436	26.06	4.3	0.72
GB Winter Flounder	29,363	1,643	399	24.28	28.94	23.01
GOM Winter Flounder	11,088	10,320	2,986	28.93	9.71	4.1
Witch Flounder	140,105	17,020	4,436	26.06	4.99	0.97
CC/GOM Yellowtail Flounder	188,796	13,433	3,732	27.78	6.96	2.03
GB Yellowtail Flounder	105,824	1,643	399	24.28	10.52	3.83
SNE/MA Yellowtail Flounder	39,884	1,952	538	27.56	9.99	4.1
GB Haddock East	93,137	481	152	31.6	16.48	12.27
GB Haddock West	88,701	6,230	1,694	27.19	10.09	4.06
GOM Haddock	16,481	10,320	2,986	28.93	8	2.82
White Hake	72,090	17,020	4,436	26.06	8.3	2.63
Pollock	243,236	17,020	4,436	26.06	8.26	2.61
Redfish	415,048	17,020	4,436	26.06	9.27	3.26
SNE/MA Winter Flounder	189,565	5,074	1,503	29.62	12.09	6.41
Southern Windowpane	177,208	1,952	538	27.56	8.49	2.97
Northern Windowpane	348,789	15,071	3,931	26.08	9.04	3.11
Ocean Pout	129,689	17,020	4,436	26.06	10.02	3.79
Halibut	68,897	17,020	4,436	26.06	6.6	1.68
Wolffish	72,463	17,020	4,436	26.06	6.81	1.79

Table 46 – FY 2010 sector/stock specific realized CVs for discard estimates

Stock	**FIXED GEAR**	**NCCS**	**NEFS 10**	**NEFS 11**	**NEFS 12**	**NEFS 13**	**NEFS 2**	**NEFS 3**	**NEFS 5**	**NEFS 6**	**NEFS 7**	**NEFS 8**	**NEFS 9**	**PORT CYLDE**	**SUSTHARV 1**	**TRI-STATE**
CC/GOM Yellowtail	16		11	***34***	***41***	***80***	13	14		***49***	***67***	***48***	***47***	***70***	***35***	28
GB Cod East	13					19	29				***50***	24	14		***42***	
GB Cod West	8		26			21	16	***50***	16	***38***	24	22	14		22	30
GB Haddock East	28					23	29				16	***31***	18		22	
GB Haddock West	18		***56***			29	21	***93***	***38***	***62***	19	***31***	25		***35***	***50***
GB Winter	***42***					***41***	***40***		***39***	30	***39***	***47***	25		***44***	***38***
GB Yellowtail	***54***					23	***34***		***34***	***99***	18	29	21		17	25
GOM Cod	16	***62***	9	15	28		9	7		26			***38***	11	13	26
GOM Haddock	***81***	***50***	***35***	16			17	15		***74***			***45***	24	21	
GOM Winter	***35***		19	25	***38***	***113***	17	14		***64***			***88***	***73***	27	***46***
Halibut	20	***46***	17	17	***74***	26	10	15	***50***	***31***	24	***37***	19	20	10	***42***
Northern Windowpane	***31***		18	***50***	29	***33***	11	12	***36***	***39***	16	12	25	***79***	22	***34***
Ocean Pout	27		18	***57***	***75***	***33***	13	26	23	***61***	***32***	22	16	***61***	***40***	26
Plaice	27		16	27	23	***37***	8	***32***	***60***	20	17	25	15	21	8	***48***
Pollock	18	***84***	***32***	20	***76***	***72***	17	22	***75***	***38***	***67***	***57***	28	27	14	***52***
Redfish	19	***83***	***54***	***39***	***38***	***45***	23	17	***62***	27	***33***	***49***	25	20	16	
SNE/MA Winter	13		28			24	***69***	***91***	8	***88***	***60***	***60***	***35***		26	
SNE/MA Yellowtail Flounder	***53***					25		***57***	14		***62***	***60***			***36***	
Southern Windowpane	***61***					22		***85***	9		***49***	***63***			***49***	
White Hake	23	***52***	27	***40***		***46***	22	23	***38***	***64***	27	***37***	19	20	18	***56***
Witch Flounder	***50***		17	***31***	***42***	***31***	10	22	24	25	21	***33***	17	17	9	26
Wolffish	12	***81***	12	20	***33***	***33***	12	27		***54***	***30***	***45***	23	23	19	***74***

Table 47 – FY 2011 sector/stock realized CVs for discard estimates

Stock	FIXED GEAR	NCCS	NEFS 10	NEFS 11	NEFS 12	NEFS 13	NEFS 2	NEFS 3	NEFS 5	NEFS 6	NEFS 7	NEFS 8	NEFS 9	PORT CYLDE	SUST HARV 1	TRI-STATE
CC/GOM Yellowtail	***31***		15	30	***39***	***60***	13	10		24	***82***	***62***	25	***41***	27	22
GB Cod East	24					***31***	***51***		***54***	***56***	18	23	18		***31***	
GB Cod West	14		28		***76***	20	21	***54***	21	***34***	28	21	17		25	6
GB Haddock East	***42***					24	***33***		***73***	***39***	13	21	19		27	
GB Haddock West	29		***48***		***76***	22	29	***91***	***40***	***40***	***58***	23	20		16	28
GB Winter Flounder	***69***					***35***	***33***		***55***	***103***	***31***	***35***	***34***		24	***72***
GB Yellowtail Flounder	***54***					24	***44***		***43***	***67***	22	24	17		22	29
GOM Cod	***41***	13	10	8	26	***57***	9	5		***30***	24	***51***	***34***	10	13	16
GOM Haddock	***45***		19	20	19	***61***	22	11		***43***	***31***		***59***	***41***	12	
GOM Winter Flounder	***34***		17	17	***50***		17	8		28	***71***	***41***	***35***	***39***	26	18
Halibut	***68***	24	18	28	***32***	21	13	14	***52***	22	22	24	20	17	9	***63***
Northern Windowpane	19		18	24	***39***	23	11	11	***64***	27	18	28	17		24	23
Ocean Pout	***51***	***30***	18	***44***	***53***	28	10	17	23	***33***	***34***	27	14	***87***	14	28
Plaice	18	23	12	14	26	23	9	12	***60***	22	19	24	12	22	7	29
Pollock	17	28	***31***	22	20	***39***	16	25	***51***	27	***44***	***34***	26	13	16	***92***
Redfish	***36***	24	25	20	21	24	14	15		22	***51***	***32***	20	18	13	
SNE/MA Winter	15		29			17	***45***	***55***	9	***66***	***44***	***56***	***37***		***32***	
SNE/MA Yellowtail						19		***91***	12		***37***		***63***		27	
Southern Windowpane			***83***	***66***		16			10		***40***		***48***		***38***	
White Hake	16	24	***37***	14	25	***36***	***36***	18	***33***	***40***	***40***	***47***	25	13	24	***64***
Witch Flounder	***87***	24	15	12	25	17	10	27	18	22	17	23	18	17	8	***37***
Wolffish	17	***47***	28	22	***42***	***31***	11	9		***32***	29	***37***	23	19	17	***39***

Figure 20 - CV vs, discard estimates at the sectors stock level, FY 2010

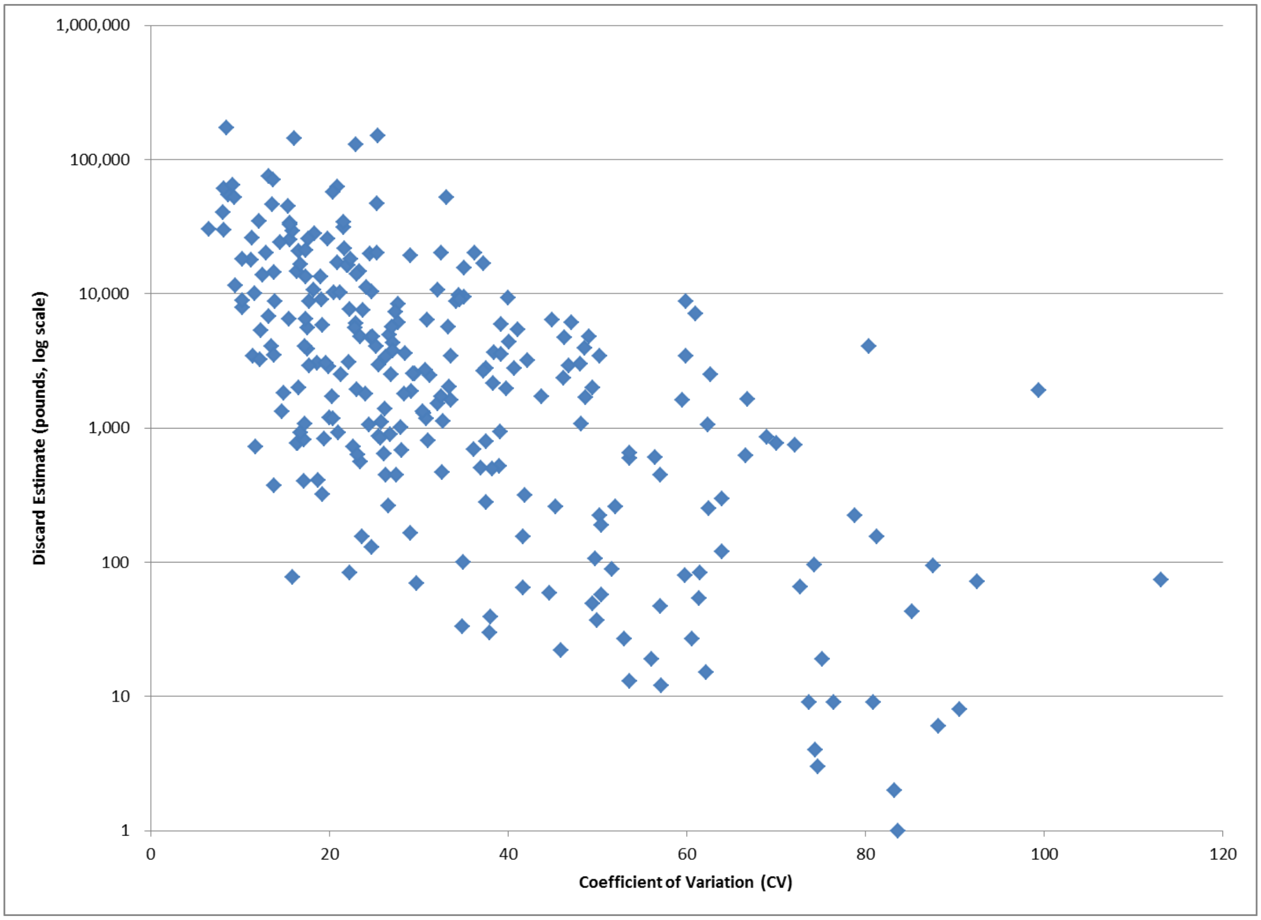
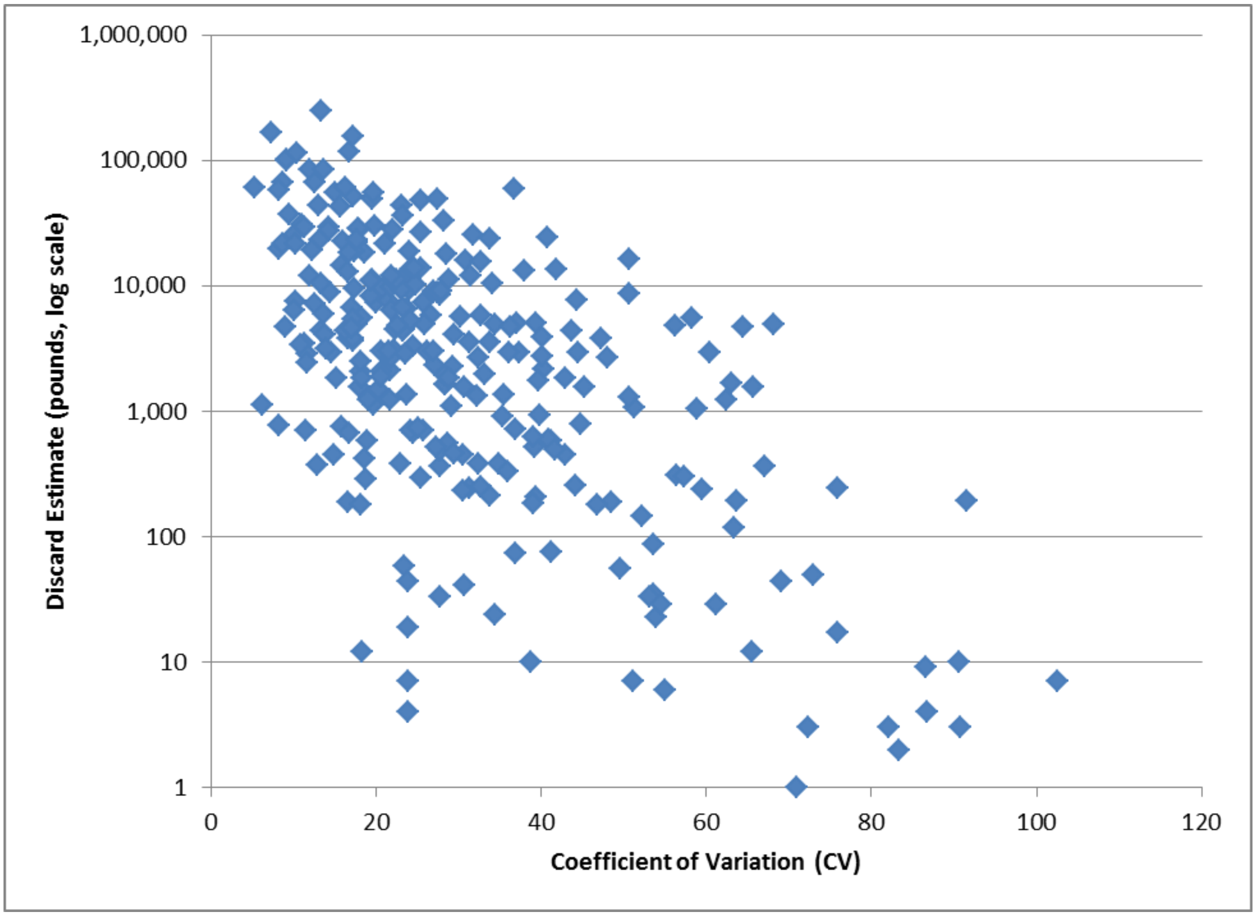


Figure 21 – CV vs, discard estimates at the sectors stock level, FY 2011



6.5.12.1.2 Length Frequency Analysis of Discards

The PDT examined the established minimum sizes of the allocated groundfish following discussion of the large number of sub-legal yellowtail flounder (approximately 12" Total Length) being discarded. Fishermen are faced with paying for at sea monitoring from FY2013 and beyond. The reduction in regulatory discards could increase landings and reduce monitoring costs but may have unexpected impacts on a population if fishing behavior changes in response to markets developing for currently undersized fish.

ASM and NEFOP observer data from 2008 to 2012 were examined to determine the length distribution of discarded cod, haddock, Pollock, witch flounder, yellowtail flounder, American plaice, Atlantic halibut, winter flounder and redfish. This analysis focused on trawl gear, including variations such as the Ruhle trawl and the haddock separator trawl. A number of other parameters were looked at to detect any influences on the length frequency by statistical area, gear type, mesh size, mesh shape, depth, quarter and year.

Large numbers of sub-legal sized fish are being discarded for allocated groundfish. A reduction in the minimum size would reduce discards on some species but may not have a significant effect for others because factors other than the minimum size regulations are driving those discards. A reduction in the minimum size, e.g. by an inch, is expected to reduce discards for cod, haddock, witch flounder, yellowtail flounder, plaice and winter flounder; reductions for pollock, halibut and redfish may not be as significant. Some of the revised minimum size estimates are below the length at 50% maturity. For the species where estimates of size at 50% maturity are available, it is clear that the majority of the fish over the minimum size is mature and has a higher probability of having already contributed to the spawning population. The initial contribution of newly maturing fish to the spawning population may be small but their lifetime fecundity may contribute significantly. The reduction or removal of the minimum size regulations would alter the ratio of mature and immature fish. If the minimum size is reduced more mature fish would be removed. The analysis also indicates that changes to trawl gear mesh size or configuration could also reduce discards.

A more detailed PDT report can be found at www.nefmc.org.

6.5.13 Overview of the Atlantic Sea Scallop Fishery

The Scallop FMP was implemented in 1982 and limited entry followed in 1994 (Amendment 4). In the fishing years 2002-2011, the landings from the northeast sea scallop fishery stayed above 50 million pounds, surpassing the levels observed historically (Figure 22). The recovery of the scallop resource and consequent increase in landings and revenues was striking given that average scallop landings per year were below 16 million pounds during the 1994-1998 fishing years, less than one-third of the present level of landings. This section provide background information in terms of landings, revenues, permits, vessels and various ports and coastal communities in the Northeast Sea Scallop Fishery based on the Appendix I to Framework 24. Unless otherwise indicated, all the Tables referred below are included in the same Appendix (Appx. I, FRW 24).

The limited access scallop fishery consists of 347 vessels. It is primarily full-time, with 250 full-time (FT) dredge, 52 FT small dredge vessels and 11 FT net boats (Table 7 and Table 8, Appx. I, FRW 24). Since 2001, there has been considerable growth in fishing effort and landings by vessels with general category permits, primarily as a result of resource recovery and higher scallop prices. Amendment 11 implemented a limited entry program for the general category fishery reducing the number of general category permits after 2007. In 2011, there were 288 LAGC IFQ permits, 103 NGOM and 279 incidental catch permits in the fishery totaling 670 permits (Table 13, Appx. I, FRW 24). Although not all vessels with general category permits were active in the years preceding 2008, there is no question that the number of vessels (and owners) that hold a limited access general category permit under the Amendment 11 regulations are less than the number of general category vessels that were active prior to 2008 (Table 11 and Table 12, Appx. I, FRW 24).

Figure 23 shows that total fleet revenues more than quadrupled from about $120 million in 1994 to almost $600 million in 2011 (in inflation-adjusted 2011 dollars). Scallop ex-vessel prices increased after 2001 as the composition of landings changed to larger scallops that in general command a higher price than smaller scallops. However, the rise in prices was not the main factor that led to the increase in revenue in the recent years compared to 1994-1998. The increase in total fleet revenue was mainly due to the increase in scallop landings and the increase in the number of active limited access vessels during the same period.

There has been a steady decline in the total DAS used by the limited access scallop vessels from 1994 to 2011 fishing years as a result of the effort-reduction measures since Amendment 4 (1994) (

Figure 24). The impact of the decline in effort below 30,000 days-at-sea since 2005 (with the exception of 2007) on scallop revenue per vessel was small, however, due to the increase in LPUE from about 1,600 pounds per day-at-sea in 2007 to over 2,300 pounds per day-at-sea in 2011.

The scallop fishery is facing a decline in 2013. Recruitment has been below average for several years on Georges Bank and overall biomass is lower than previous years. Most of the scallop access areas have lower biomass than years past, and several areas in the Mid-Atlantic will be closed in 2013 to protect smaller scallops for future access. Total catch in 2013 will be about 30% less than catch levels in 2012 and 2011. Catch is expected to increase again over 22,000 mt (about 50 million pounds) starting in 2016, if the high levels of recruitment in the Mid-Atlantic grow as projected (Figure 25).

Figure 22 – Scallop landings by permit category and fishing year 1994-2011 (dealer data)

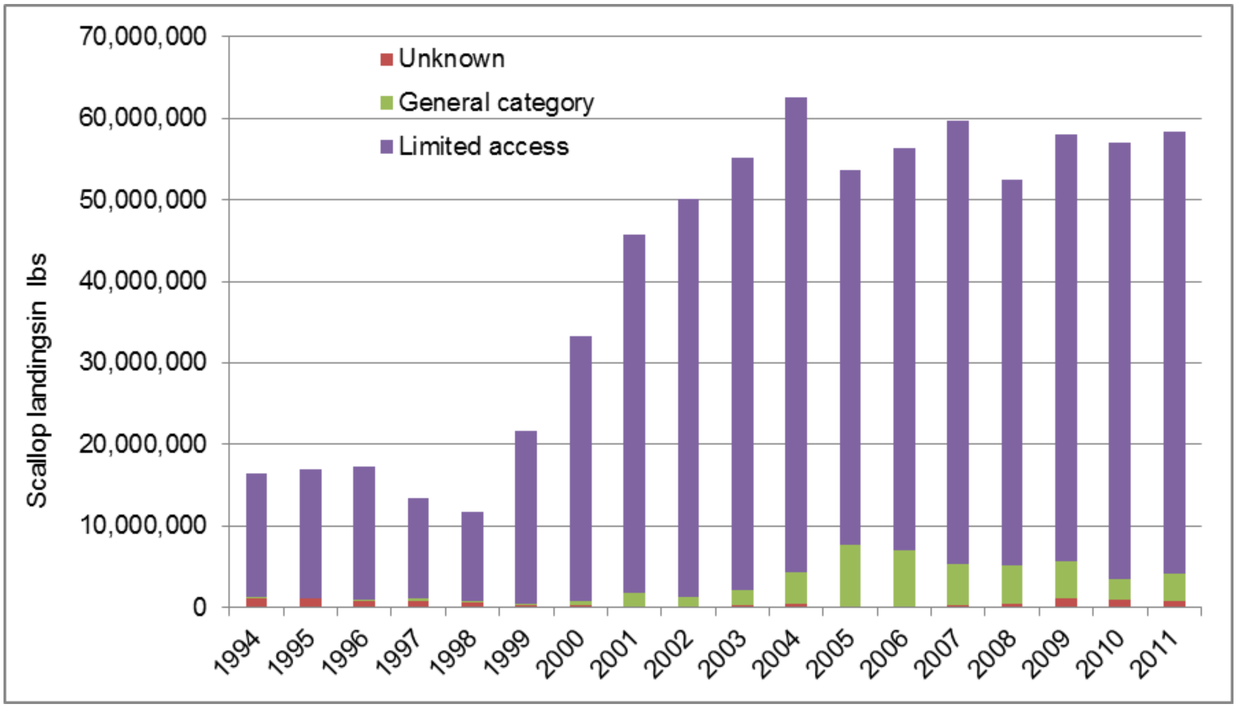


Figure 23 – Scallop revenue by permit category and fishing year in 2011 inflation adjusted prices (dealer data)

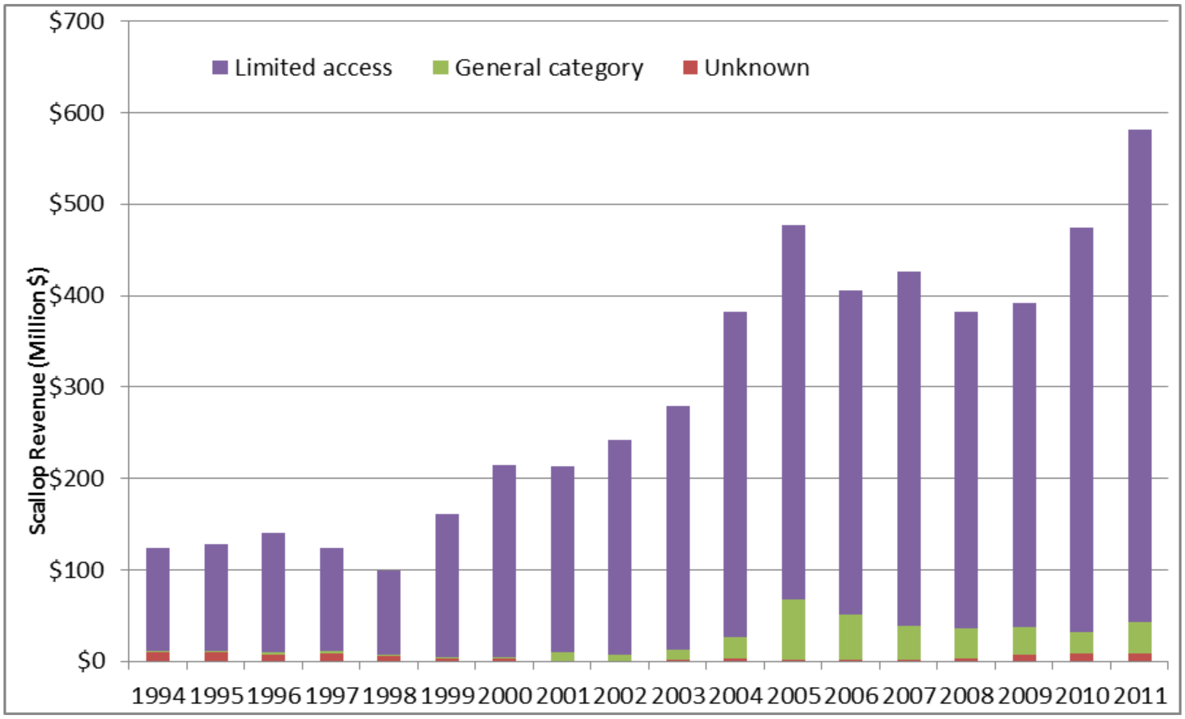


Figure 24 – Total DAS used (date landed – date sailed from VTR data) by all limited access vessels and LPUE

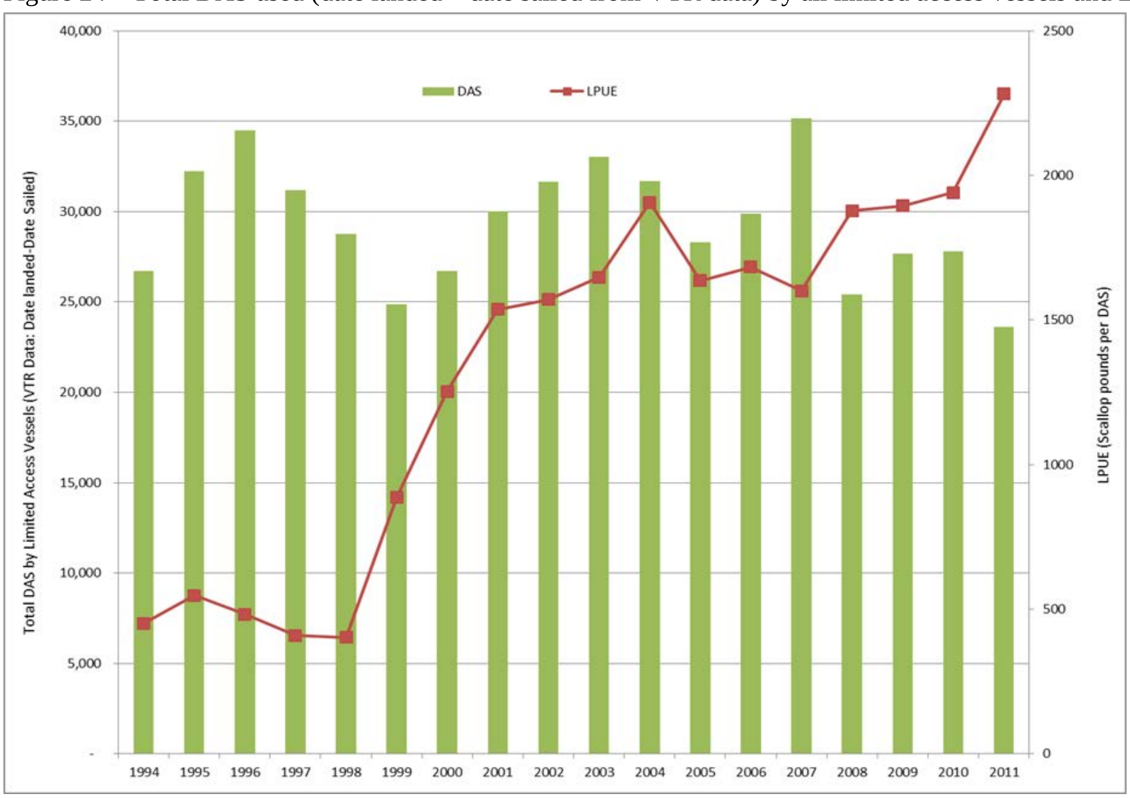
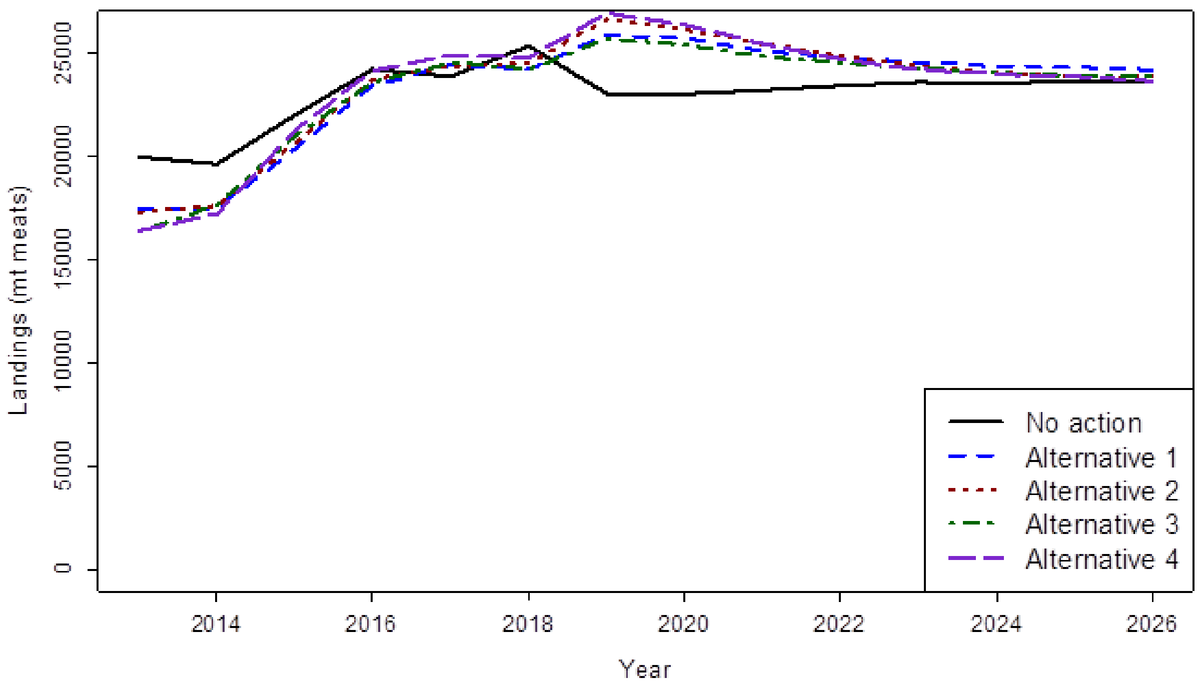


Figure 25 – Projection of future scallop catch under proposed FW24 specifications for FY2013 (Alternative 2)



Most limited access category effort is from vessels using scallop dredges, including small dredges. The number of vessels using scallop trawl gear has decreased continuously and has been at 11 full-time trawl vessels since 2006 (Section 1.1.6 of Appx. I, FRW 24). Furthermore, according to the 2009-2010 VTR data, the majority of these vessels (10 out of 11 in 2010) landed scallops using dredge gear even though they had a trawl permit. Most general category effort is, and has been, from vessels using scallop dredge and other trawl gear. The percentages of scallop landings show that landings made with a scallop dredge in 2012 continue to be the highest compared to other general category gear types (Table 18 and Table 22, A Appx. I, FRW 24).

Both full-time and part-time limited access vessels had a high dependence on scallops as a source of their income. Full-time limited access vessels had a high dependence on scallops as a source of their income and the majority of the full-time vessels (94%) derived more than 90% of their revenue from the scallop fishery in 2011 (Table 37, Appx. I, FRW 24). Comparatively, part-time limited access vessels were less dependent on the scallop fishery in 2011, with only 37% of part-time vessels earning more than 90% of their revenue from scallops (Table 37, ibid).

Table 38 shows that general category permit holders (IFQ and NGOM) are less dependent on scallops compared to vessels with limited access permits.   In 2011, less than half (43%) of IFQ permitted vessels earned greater than 50% of their revenue from scallops. Among active NGOM permitted vessels (that did not also have a limited access permit), 88% had no landings with scallops in 2011. Scallops still comprise the largest proportion of the revenue for IFQ general category vessels, accounting for 38.6% of these vessels revenue. Scallops still comprise the largest proportion of the revenue for IFQ general category vessels, accounting for 38.6% of these vessels revenue (Table 39 Appx I, FRW 24,). For NGOM vessels (that did not also have a limited access permit) scallop landings accounted for less than 1% of revenue in 2011. The composition of revenue for both the IFQ and NGOM general category vessels are shown in Table 39 (ibid).

The number of crew positions, measured by summing the average crew size of all active limited access vessels on all trips that included scallops, has increased slightly from 2,172 positions in 2007 to 2,262 positions in 2011 (a 4% increase) (Table 47, Appx. I, FRW 24). Broken out by home port state, the number of crew positions has stayed relatively constant during the past five years. Limited access vessels with a home port in Massachusetts and New Jersey experienced the largest percentage increase (5%: 969 to 1015 crew positions in MA and 15%: 490 to 564 crew positions in NJ). However, total crew effort in the limited access fishery, measured by crew days, declined from 207,088 to 160,355 (23%, Table 50, Appx I, FRW 24) from 2007 to 2011. The number of crew days on general category vessels followed a similar pattern as the general category crew positions and trips, with large declines in 2008 and 2010, but then an increase in days in 2011(Table 52, ibid.).

The landed value of scallops by port landing fluctuated from 1994 through 2011 for many ports. In 2011 New Bedford accounted for 53% of all scallop landings and it continues to be the number one port for scallop landings. Included in the top five scallop ports are: Cape May, NJ; Newport News, VA; Barnegat Light/Long Beach NJ; and Seaford, VA. It is also fair to describe the fishing activities in these ports as highly reliant on the ex-vessel revenue generated from scallop landings as scallop landings represent greater than 75% of all ex-vessel revenue for each of the ports (Table 59, Appx. I, FRW 24). There are also a number of ports with a comparatively small amount of ex-vessel revenue from scallops but where that scallop revenue represents a vast majority of the revenue from landings of all species (Table 60, ibid.). In 2011, in the ports of Newport News, VA and Seaford, VA; revenue from scallop landings accounted for 89.0% and 99.9% of all ex-vessel revenue respectively (Table 60, ibid.).

In terms homestate, the vessels from MA landed over 45% of scallops in 2010 and 2011 fishing years, followed by NJ with about 24.5% of all scallops landed by vessels homeported in this state (Appx. I, FRW 24). Scallops also comprise a significant proportion of revenue (and landings) from all species with over 90% of total revenue in VA, over 75% of total revenue in NC, over 60% of total revenue in MA and over 68% of total revenue in NJ (ibid.).

As in previous years, the largest numbers of permitted limited access scallop vessels have home ports of New Bedford, MA and Cape May, NJ, which represent 39% and 21% of all limited access vessels, respectively (Table 62, Appx. I, FRW 24). New Bedford also has the greatest number of general category scallop vessels, but while limited access vessels are mostly concentrated in the ports of New Bedford and Cape May, general category vessels are more evenly distributed throughout coastal New England. In addition to New Bedford, Point Judith, RI, Gloucester, MA, Boston, MA, Cape May, NJ and Barnegat Light, NJ, are all the homeport of at least 20 vessels with general category scallop permits (Table 63, ibid).

Figure 26 – FY 2011 Common Pool catches

Stock	Cumulative Kept (mt)	Cumulative Discard (mt)	Cumulative Catch (mt)	Sub-ACL (mt)	Percent Caught
GB Cod East	1.8	0.0	1.8	4	44.9
GB Cod	58.1	3.4	61.5	93	66.1
GOM Cod	69.8	23.7	93.4	104	89.9
GB Haddock East	0.0	0.0	0.0	59	0.0
GB Haddock	11.7	0.0	11.7	187	6.3
GOM Haddock	1.9	0.1	1.9	8	24.3
GB Yellowtail Flounder	1.8	0.2	2.0	20	10.1
SNE/MA Yellowtail Flounder	11.5	0.8	12.2	120	10.2
CC/GOM Yellowtail Flounder	8.6	2.7	11.4	27	42.1
Plaice	3.9	0.5	4.5	70	6.4
Witch Flounder	3.9	0.3	4.2	25	16.8
GB Winter Flounder	1.1	0.1	1.1	14	8.2
GOM Winter Flounder	2.6	0.1	2.6	16	16.5
SNE/MA Winter Flounder	0.3	6.7	7.0	726	1.0
Redfish	3.4	0.2	3.6	36	9.9
White Hake	13.1	1.1	14.1	28	50.4
Pollock	65.5	3.8	69.2	104	66.6
Northern Windowpane	0.0	0.3	0.3	110	0.3
Southern Windowpane	2.2	26.3	28.5	154	18.5
Ocean Pout	0.0	4.4	4.4	239	1.8
Halibut	1.0	0.1	1.2	33	3.5
Wolffish	0.0	0.7	0.7	73	1.0

Table 48 – Summary of common pool fishing activity (confidential data excluded)

		HB	**A**	**C**	**D**	**HA**	**Total**
2010	Permits Landing Groundfish	64	58	5	6	34	163
	Groundfish Pounds Landed	18,116	1,383,650	1,733	2,329	36,844	1,442,672
	Groundfish Revenues	$42,961	$1,930,439	$3,857	$3,626	$59,727	$2,040,610
2011	Permits Landing Groundfish	62	47	6	5	32	147
	Groundfish Pounds Landed	39,295	400,603	36,929	2,910	91,585	571,321
	Groundfish Revenues	$47,535	$530,738	$62,304	$6,201	$167,838	$814,616

Table 49 – Common pool groundfish landings by state of trip (pounds, live weight) (confidential data excluded)

	2010	2011
MA	903,121	408,562
MD		5
ME	397,257	55,486
NH	7,536	34,445
NJ	11,803	18,665
NY	96,487	36,864
RI	26,446	15,288
VA	5	95
Grand Total	1,442,656	569,411

Table 50 – Common pool groundfish landings by trip port (pounds, live weight)(c0nfidnetila data excluded)

	2010	2011	Total
GLOUCESTER	427,043	270,533	697,576
PORTLAND	388,279	46,017	434,296
NEW BEDFORD	305,389	32,161	337,550
PROVINCETOWN	103,239	76,973	180,212
MONTAUK	79,045	20,820	99,864
LITTLE COMPTON	20,886	8,490	29,376
POINT PLEASANT	7,695	16,775	24,470
HAMPTON BAYS	12,743	6,626	19,369

Table 51 – Common pool landings by permit category and stock

FY 2010 Landings	HB	A	C	D	HA	Grand Total
CODGBW	3,405	115,809	899	1,456	6,514	128,083
CODGMSS	1,328	405,599	761		18,747	426,434
FLDSNEMA		3,311				3,311
FLWGB		12,975				12,975
FLWGMSS	2,905	43,620				46,525
FLWSNEMA	67	3,349	50		23	3,489
HADGBW	233	201,681		11	172	202,098
HADGM	383	13,403	3		1,074	14,863
HALGMMA	3,484	157			293	3,934
HKWGMMA	882	87,785			145	88,812
OPTGMMA	134					134
PLAGMMA	243	46,874				47,117
POKGMASS	3,745	299,944	15	859	9,788	314,351
REDGMGBSS	2	13,410	5	3	88	13,508
WITGMMA		56,310				56,310
WOLGMMA	0					0
YELCCGM	1,306	33,143				34,449
YELGB		17,135				17,135
YELSNE		29,144				29,144
Grand Total	18,116	1,383,650	1,733	2,329	36,844	1,442,672
FY 2011 Landings						
CODGBE		3,907				3,907
CODGBW	5,796	97,183	3,506	175	17,382	124,041
CODGMSS	1,834	62,772	21,988	2,733	63,928	153,255
FLDSNEMA		4,802				4,802
FLWGB		2,411				2,411
FLWGMSS	39	5,257	373			5,669
FLWSNEMA	125	540	1	2		668
HADGBE		10				10
HADGBW		25,655			97	25,752
HADGM	898	2,216	182		858	4,153
HALGMMA	989	75			178	1,243
HKWGMMA	60	24,635	3,862		236	28,793
PLAGMMA	7	7,852	686			8,545
POKGMASS	29,284	100,631	5,257		8,759	143,931
REDGMGBSS	182	7,031	38		147	7,398
WITGMMA		7,543	970			8,513
YELCCGM	74	18,889	66			19,029
YELGB		3,944				3,944
YELSNE	7	25,250				25,257
Grand Total	39,295	400,603	36,929	2,910	91,585	571,321

6.5.14 Overview of the American Lobster Fishery

Today, the commercial sector of the American lobster fishery and the communities involved in that fishery can be seen as the product of resource fluctuation, social and economic conditions as well as changes in management. These conditions impact, not only to the lobster fishery but other fisheries in the region as well. The numbers of fishermen entering or leaving the lobster fishery are often linked to the relative conditions of other fisheries. Also, because of the changes considered in the current sector operation plans could have an effect on the lobster fishery and its communities an overview of lobster fishery is included below.

The commercial lobster fishery is described as having started in the 1840s, concurrent with the development of the re-circulating seawater tank which allowed for an increased distribution of caught lobster (Acheson, 2010). Early in the fisheries history effort was managed by individual states with little interstate uniformity. It wasn't until 1972 that states along the Atlantic coast began cooperative management of the resource under a NMFS State-Federal Partnership Program. As part of this partnership program, the Northeast Maine Fisheries Board (NMFB) was formed to help research and expand management of the American lobster. Following implementation of the 1976 Fisheries Conservation and Management Act (FCMA), the NMFB developed a comprehensive management plan which was submitted to the newly created New England Fishery Management Council in 1978. This management plan would act as a precursor to the NEFMC's American Lobster Fishery Management Plan (ALFMP) that was eventually adopted in 1983. From 1983 to 1994 the lobster fishery was primarily managed through a standardized gear requirement, a minimum landed size and a prohibition on landing 'berried' females. The first real step in limiting effort in the fishery was not taken until 1994 when Amendment 5 to the FMP included a permit moratorium that restricted entry (Acheson, 1997).

Concurrent with the Federal management of the lobster fishery was the implementation of an Interstate Fishery Management Plan (ISFMP) developed by the ASMFC in 1978. The original plan's primary purpose was to establish regulatory uniformity across state and federal jurisdictions, but by 1995, it was becoming clear that maintaining separate management authority by the Atlantic States Marine Fisheries Commission (ASMFC) and its member states under the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) and the NMFS under the FCMA was not accomplishing a unified approach to lobster management. Federal authority over the lobster fishery was eventually transferred to the ASMFC in 1999, by which point seven different lobster conservation areas had been identified (Acheson, 2004). Currently each Lobster Conservation Management Area (LCMA) has its own effort reduction needs which are developed by the respective management team. Amendment 3 to the ISFMP set default trap limits for four of the management areas and Addendum 1 set trap limits for the remaining three.

In 1976 there were an estimated 10,356 vessels participating in the inshore trap fishery and 117 vessels participating in the offshore lobster fishery (Acheson, 1997). Since Amendment 3 and the transfer of federal authority to the ASMFC in 1999, vessel operators have had to apply for an area specific trap permit to fish in one of the seven LCMAs. These permits are not mutually exclusive and owners may apply for any permit for an area that they wish to fish. There are also specific permit categories for non-trap and charter/party fishing as well. Typically the area specific trap permits are used by the directed trap fishery while the non-trap permits are used by the much smaller offshore mobile gear fishery or so that vessels using non-trap gear may land incidentally caught lobsters.

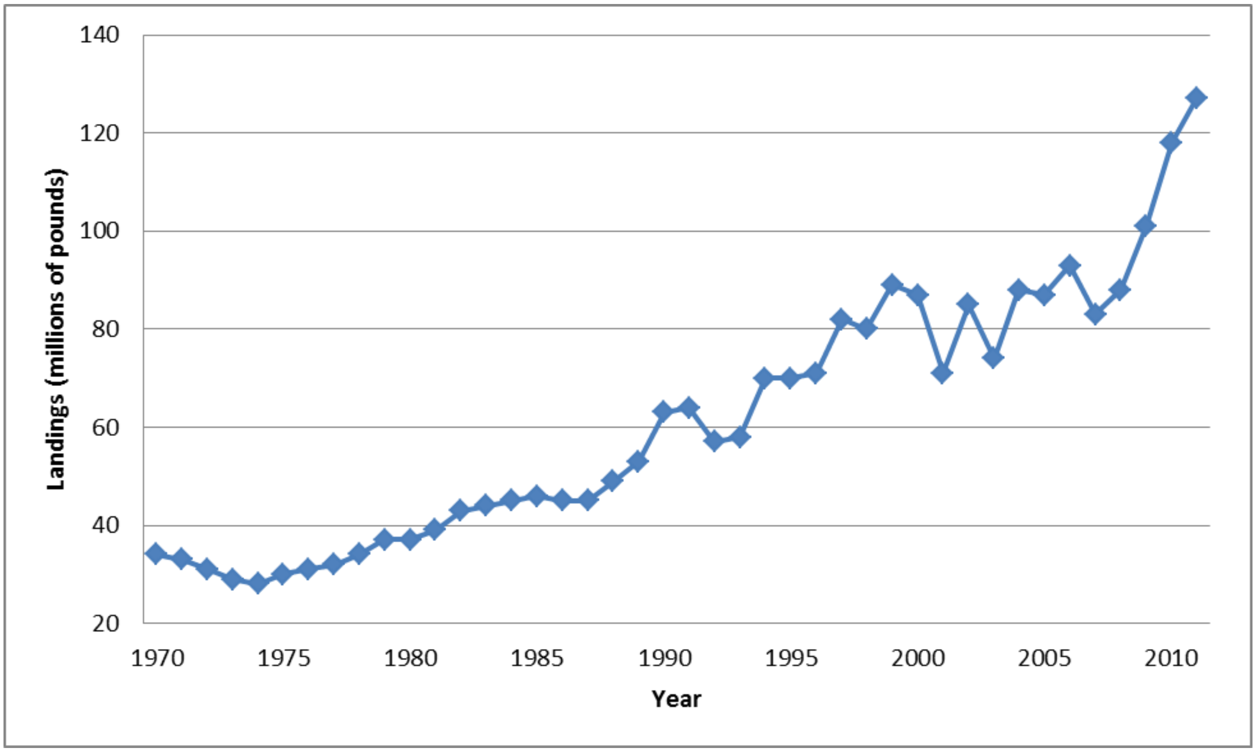
The total number of vessels with any type of lobster permit has stayed relatively constant since the change in management in 1999 (Table 52). The states of Maine and Massachusetts are home to the most vessels with a lobster permit, and combined they account for three quarters of permitted vessels (Table 4.6.9-1). There are some notable differences between the states with regard to the type of permits vessels have. Over the last twelve years, 96% - 99% of vessels with a homeport in Maine have had an area specific trap permit as opposed to only 4% - 8% having the non-trap permit. About half the vessels from other states possess a non-trap permit. For example, in 2011, 483 out of 908 vessels with a home port in Massachusetts have a non-trap permit while two thirds have an area specific trap permit.

Table 52 - Numbers of vessels by homeport state, lobster permit type and year

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total	3233	3253	3297	3217	3357	3353	3394	3288	3213	3175	3139	3116
ME												
Any LO permit	1187	1210	1286	1335	1417	1462	1527	1455	1413	1424	1428	1452
Non-trap	61	51	57	66	106	116	117	113	107	104	97	93
Charter	2	1	1	2	2	2	1	1				
Any area trap	1160	1189	1268	1314	1376	1409	1469	1404	1368	1375	1381	1414
NH												
Any LO permit	89	97	93	95	116	117	118	115	117	109	111	111
Non-trap	40	46	46	49	56	56	61	61	59	56	60	53
Charter	2	1	1	2	2	2	2	2	2	2	2	2
Any area trap	66	74	72	71	91	89	83	83	85	85	83	85
MA												
Any LO permit	1215	1185	1169	1114	1106	1055	1022	1016	986	974	944	908
Non-trap	442	449	466	474	500	498	497	521	520	518	500	483
Charter	5	3	7	7	8	7	6	7	8	8	7	6
Any area trap	892	894	885	814	793	742	716	684	656	635	617	589
RI												
Any LO permit	257	265	256	243	243	240	240	234	228	217	213	209
Non-trap	73	83	82	88	84	91	90	91	89	83	78	75
Charter	1	1	1	1	1	1	1	2	2	2	2	2
Any area trap	212	222	220	198	203	198	198	191	183	177	176	172
CT												
Any LO permit	32	37	37	34	33	30	30	30	30	31	28	27
Non-trap	12	16	17	18	22	21	21	21	21	20	20	19
Charter					2	2	2	2	2	2	4	4
Any area trap	25	31	30	25	24	22	21	22	21	22	22	22
NY												
Any LO permit	162	153	147	127	138	134	141	128	124	124	118	120
Non-trap	90	86	83	87	91	83	90	79	81	80	77	78
Charter	4	3	3	5	7	7	6	5	5	5	2	1
Any area trap	94	91	93	66	82	85	86	79	73	74	71	71
NJ												
Any LO permit	166	180	184	152	184	186	193	192	202	190	194	192
Non-trap	78	95	95	117	122	134	138	136	144	136	138	139
Charter	13	10	10	10	13	12	11	11	11	11	11	11
Any area trap	105	115	118	50	86	82	83	84	91	88	89	82

Although the fishery has existed for almost two centuries, consistent and relievable landing statistics are not available prior to 1950. From about 1957 through 1974, landings from the lobster fishery remained relatively constant at an average of about 30 million pounds per year. Landings of lobster steadily increased from 28 million pounds in 1974 to 64 million pounds in 1991 before declining to 57 million pounds in 1992 (Figure 27). Landings then continued to rise to 89 million pounds in 1999, after which lobster landings would oscillate almost year to year by nearly 15 million pounds from 2000 to 2007. In the most recent years lobster landings have experienced an unprecedented high exceeding 100 million pounds since 2009, and nearly reaching 127 million pounds in 2011.

Figure 27 - Trend in landings of American lobster 1970 - 2011



Maine has always been the leading producer of lobsters, but its share of total landings has fluctuated over time. Throughout the 1970s Maine accounted for between 52% and 61% of total lobsters landed from Maine to New Jersey (Table 53). Expansion of lobster landings during the 1980s, particularly in Massachusetts, reduced the share of lobster Maine supplies to less than 50% until the mid 1990s. However, since 2000 the contribution of the Maine lobster fishery to total landings increased steadily to more than 80% of the domestic harvest in 2004 before declining slightly 2005 - 2008. The increasing proportion of Maine landings is due to a combination of increased landings in Maine and declining landings in just about every other state.

Table 53 - Annual share or 5-year average annual share of lobster landings by state, 1970–2011

Year(s)	ME	NH	MA	RI	CT	NY	NJ
1970 - 1974	55.1%	1.9%	19.8%	12.8%	1.9%	3.9%	4.5%
1975 - 1979	58.3%	1.6%	24.0%	9.7%	2.0%	1.9%	2.5%
1980 - 1984	52.5%	2.5%	29.3%	8.4%	3.2%	2.5%	1.7%
1985 - 1989	43.7%	2.5%	32.6%	11.1%	3.8%	3.3%	3.0%
1990 - 1994	49.5%	2.7%	25.7%	11.0%	3.9%	5.1%	2.1%
1995 - 1999	55.9%	1.9%	19.3%	7.6%	3.9%	10.4%	0.9%
2000	65.9%	2.0%	18.2%	8.0%	1.6%	3.3%	1.0%
2001	68.2%	2.8%	17.0%	6.2%	1.9%	2.9%	0.8%
2002	74.7%	2.4%	15.1%	4.5%	1.3%	1.7%	0.3%
2003	74.6%	2.7%	15.5%	4.7%	0.9%	1.3%	0.3%
2004	81.1%	0.2%	12.8%	3.5%	0.7%	1.1%	0.4%
2005	78.3%	2.9%	11.3%	4.9%	0.8%	1.3%	0.4%
2006	78.4%	2.9%	11.9%	4.1%	0.9%	1.3%	0.5%
2007	77.3%	3.7%	12.3%	3.9%	0.7%	1.2%	0.8%
2008	79.3%	2.9%	12.0%	3.2%	0.5%	1.4%	0.7%
2009	80.7%	3.0%	11.7%	2.8%	0.5%	1.0%	0.3%
2010	81.7%	3.1%	10.8%	2.5%	0.3%	1.0%	0.6%
2011	83.0%	3.1%	10.6%	2.2%	0.1%	0.5%	0.6%

From 1970 up to the present, the American lobster fishery has been either the most or second most valuable fishery in the Northeast region. Nominal dockside revenue from American lobster has increased steadily from $33 million in 1970 to $314 million in 2000. Since 2000, revenues from lobster have fluctuated but most recently they have exceeded $400 million in 2010 and 2011 (Table 54). As with landings, Maine has consistently had the highest revenues from lobster of any NE state.

Table 54 - Lobster revenue (in thousands of dollars) by state and year 2000-2011

	ME	NH	MA	RI	CT	NJ	NY	Total
2000	$187,715	$7,081	$70,128	$28,103	$5,501	$3,694	$11,555	$314,070
2001	$153,982	$8,072	$53,469	$18,747	$5,453	$2,471	$7,357	$249,840
2002	$210,950	$8,164	$56,582	$15,875	$4,226	$1,139	$5,131	$302,200
2003	$205,715	$8,556	$52,373	$16,731	$3,170	$1,028	$4,426	$292,189
2004	$289,079	$925	$51,643	$14,593	$3,166	$1,800	$3,722	$365,186
2005	$317,948	$14,377	$48,793	$23,010	$3,821	$1,999	$4,396	$414,677
2006	$296,855	$13,915	$52,593	$18,408	$4,031	$2,533	$6,289	$394,918
2007	$280,645	$16,410	$51,268	$17,237	$3,222	$4,055	$5,288	$378,456
2008	$245,186	$12,268	$45,426	$12,994	$2,106	$3,215	$5,498	$326,962
2009	$237,379	$11,919	$42,561	$11,201	$1,914	$1,146	$3,932	$310,293
2010	$318,234	$14,835	$50,261	$12,371	$1,757	$2,910	$4,485	$405,058
2011	$334,974	$16,346	$53,334	$12,728	$816	$3,086	$2,533	$424,087

With respect to the influence of events occurring in other fisheries on the lobster fishery; prior to 1994 most fisheries in the Northeast region had been open access. The relative ease with which one could move between fisheries allowed vessel owners and operators participating in the lobster fishery to pursue other fisheries without having to qualify for any specific permit. At the same time, landings in the lobster fishery were increasing rapidly during the 1980s and early 1990s, drawing in additional effort that had previously been engaged in other fisheries. Once limited entry was introduced in the groundfish and scallop fisheries in 1994 many part-time lobster participants were excluded from those permit allocations as they failed to have the necessary landings to qualify. Because of resource depletion and the increasingly stringent regulations found in other fisheries, there has been a contraction of the lobster fishing industry that has increased dependence on lobster fishing (Thunberg, 2007). In the groundfish fishery there maybe contraction as well; lobster landings made by vessels in the groundfish fishery decreased by 1.4 million pounds between the first two years of sector management.

6.5.15 Small-Mesh Bottom Trawl Fishing on Georges Bank

This action considers two measures that could affect fisheries that use small-mesh bottom trawls on Georges Bank. It may adopt a requirement that these fisheries use selective trawl gear to reduce catches of GB yellowtail flounder, and it may adopt a sub-ACL for GB yellowtail flounder for small mesh fisheries. The two primary fisheries that use small-mesh on GB are the loligo squid and whiting fisheries. Often vessels make trips that land both species, so it is not always possible to assign a trip to one fishery or the other. This section provides a brief overview of fishing activity for those two fisheries.

Loligo squid and whiting are primarily caught by bottom otter trawls. The following analyses focus on normal bottom otter trawls, separator trawls, Ruhle trawls, and beam trawls that target these species on Georges Bank. There is also a small percentage of landings that cannot be attributed to gear that is included in the summaries. All weights are converted to live weights. Data are reported for calendar years, consistent with the way the loligo squid fishery is monitored. All data was extracted from the NMFS/NERO DMIS database.

A small number of vessels landed squid or whiting from the GB yellowtail flounder stock area in 2010 and 2011 (Table 55). Most loligo squid landings in 2010 and 2011 were taken in the SNE/MA area, with less than ten percent of the landings taken in the GB yellowtail flounder stock area (Table 56). Over 95% of the loligo squid caught in the GB yellowtail flounder stock area is caught in SAs 525 and 562 (Table 58). With respect to whiting, however, the GB yellowtail flounder stock area provided between 44% and 48% of total whiting landings (Table 57). Whiting is more broadly distributed in the GB yellowtail flounder stock area, with 25-30% taken in each of the SAs 522 and 525, and most of the remainder in SA 562 (Table 59).

Squid and whiting revenues from the GB yellowtail flounder stock area accounted for 24 percent of the revenues from these species on 2010, and 17 percent in 2011. For the trips that caught whiting or squid in the GB yellowtail flounder stock area, revenues from these two species accounted for over sixty percent of trip revenues. Whiting revenues were larger than squid revenues on these trips – squid accounted for 24-33 percent of the revenues from these two species (Table 60). Most of the landings from this area were in Massachusetts, with 57 percent of the revenues in 2010 and 72 percent of the revenues in 2011 from that state. Connecticut, Rhode Island, and New York were the primary other states with revenues from this area (Table 61).

Both loligo and whiting landings have a distinct seasonal component (Figure 28). Loligo landings are high in the fall and winter (first and fourth calendar year quarters) and decline in the spring and summer. Whiting landings reflect the opposite pattern.

Table 55 – Number of vessels landing whiting or loligo squid in 2010 and 2011 by broad stock areas

STOCK_AREAS	2010	2011
GOM	32	34
521	8	7
GBYTFAREA	34	30
SNEMA	320	296
OTHER	30	47
Grand Total	424	414

Table 56 – Landings of loligo squid by broad stock area, 2010 and 2011 (pounds, live weight)

STOCK_AREAS	2010	2011
GOM	38,806	17,112
521	4,154	647
GBYTFAREA	1,385,159	1,315,051
SNEMA	15,700,205	20,888,013
OTHER	60,315	117,520
Grand Total	17,188,639	22,338,343
GB YTF Area as %	8%	6%

Table 57 – Landings of whiting (silver and offshore hake) by broad stock area, 2010 and 2011 (pounds, live weight)

STOCK_AREAS	2010	2011
GOM	1,664,758	1,549,340
521	74,296	96,190
GBYTFAREA	8,747,531	7,717,515
SNEMA	7,684,438	7,979,919
OTHER	183,539	220,894
Grand Total	18,354,562	17,563,858
GB YTF Area as %	48%	44%

Table 58 – Percent of loligo squid landings from each statistical area in the GB yellowtail flounder stock area

AREA	2010	2011	Total
522	4%	1%	3%
525	57%	74%	66%
543	0%	0%	0%
561	0%	0%	0%
562	39%	24%	32%
Grand Total	100%	100%	100%

Table 59 – Percent of whiting landings from each statistical area in the GB yellowtail flounder stock area

AREA	2010	2011	Total
522	26.06%	26.62%	26.33%
525	25.73%	39.68%	32.27%
543	0.30%	0.39%	0.34%
561	0.01%	0.01%	0.01%
562	47.90%	33.29%	41.05%
Grand Total	100.00%	100.00%	100.00%

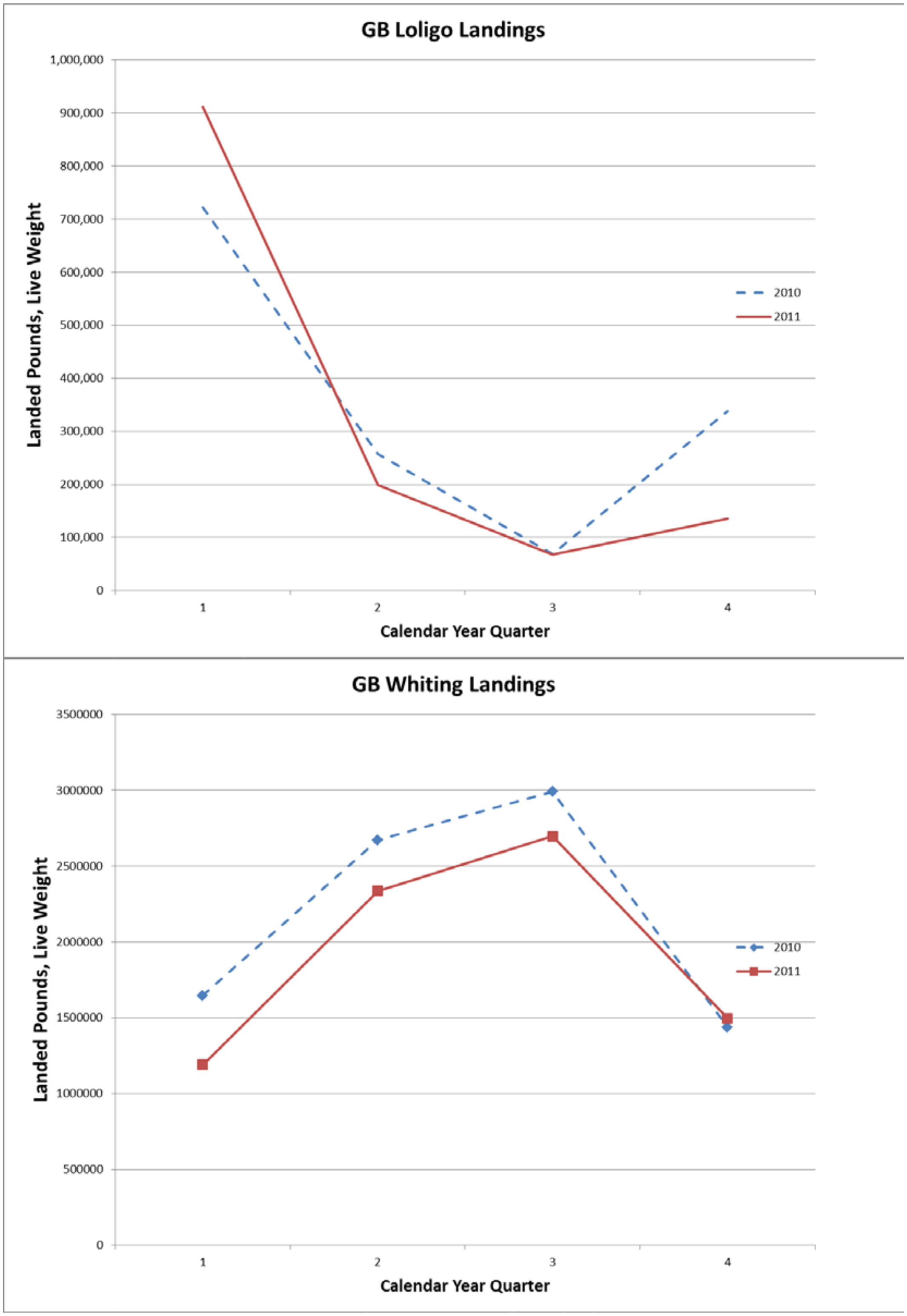
Table 60 – Revenues on squid and/or whiting trips by broad stock areas

YEAR	STOCK_AREAS	SQUID_DOLLARS	WHITING_DOLLARS	TOTAL_DOLLARS
2010	GOM	$42,269	$1,078,620	$6,849,033
	521	$6,770	$32,410	$1,369,161
	GBYTFAREA	$1,638,859	$5,275,521	$10,172,184
	SNEMA	$16,286,126	$4,780,527	$49,141,364
	OTHER	$58,925	$93,645	$600,828
2010 Total		$18,032,950	$11,260,722	$68,132,570
2011	GOM	$17,318	$999,571	$10,533,557
	521	$952	$77,317	$1,877,336
	GBYTFAREA	$1,636,814	$4,725,911	$9,930,530
	SNEMA	$24,443,913	$5,302,990	$70,296,182
	OTHER	$155,012	$110,631	$1,104,848
2011 Total		$26,254,009	$11,216,421	$93,742,453
Grand Total		$44,286,959	$22,477,143	$161,875,022

Table 61 – Revenues from squid and whiting trips by broad stock area

YEAR	DLR_STATE	SQUID_DOLLARS	WHITING_DOLLARS	TOTAL_DOLLARS
2010		$5,646	$109,616	$124,367
	CT	$167,228	$846,720	$1,169,255
	MA	$600,953	$3,021,961	$5,846,492
	ME	$0	$239	$53,647
	NY	$347,032	$910,419	$1,399,220
	RI	$517,999	$386,567	$1,579,202
2010 Total		$1,638,859	$5,275,521	$10,172,184
2011		$5,078	$43,050	$55,195
	CT	$82,915	$429,308	$588,666
	MA	$875,376	$3,805,886	$7,136,582
	ME	$0	$10	$10,443
	NJ	$1,134	$49	$1,433
	NY	$347,829	$276,891	$664,824
	RI	$324,482	$170,718	$1,473,387
2011 Total		$1,636,814	$4,725,911	$9,930,530
Grand Total		$3,275,672	$10,001,432	$20,102,714

Figure 28 - Seasonal pattern of loligo and whiting landings from Georges Bank (calendar years)



6.6 Closed Area Affected Environment

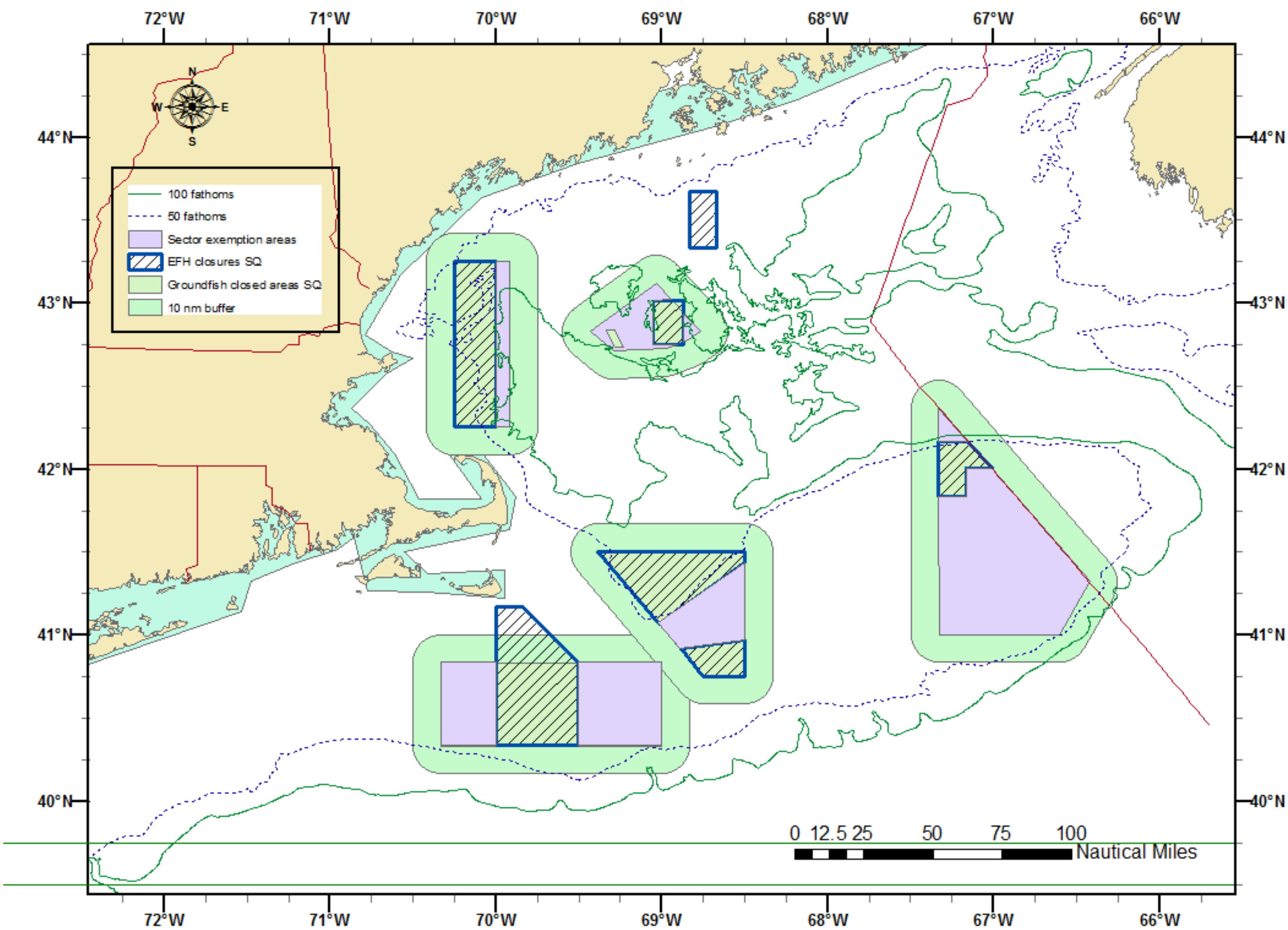
6.6.1 Analysis of biological samples on the NMFS spring, fall, and winter surveys

In order to understand the potential effects of Framework 48 management options, the biological characteristics of fish likely to be impacted were examined. A comparative analysis was conducted using spring, fall, and winter trawl survey data. Biological data examined included routine measurements of finfish, including length, weight, age, sex, and maturity.

Survey tows were tagged according to stock area and the following management area categories (see Figure 29). In many cases, data were insufficient to perform an analysis on an area by area basis, but important differences were noted whenever possible.

- Proposed sector exemption areas including non-habitat closure portions of Closed Area I, Closed Area II, Nantucket Lightship Area, Western Gulf of Maine Area, and the Cashes Ledge Area.
- Habitat closure areas including the Cod HAPC, portions of Closed Area I, all of the area that partially overlaps the Nantucket Lightship Area, portions of the Western Gulf of Maine Area, all of the area that partially overlaps the Cashes Ledge Area, and Jeffries Bank.
- A 10 nm buffer zone around the existing year round and habitat closed areas. This is a zone that tends to be more intensively fished than other areas open to fishing. One one hand the area exerts greater fishing pressure that could affect biological characteristics compared to other open fishing areas. On the other hand, these areas are most likely to receive any enhanced productivity caused by area closures, a factor that could also affect biological characteristics of caught fish.
- All remaining areas open to fishing, that overlap strata 5-9 and north to the Canadian Border. Data analysis compared fish in the three areas described above to open fishing areas separately in the Gulf of Maine and on Georges Bank.

Figure 29 - Map of Framework 48 areas and buffers applied to analysis of biological data collected during spring, fall, and winter surveys.



A summary of important differences (or in some cases lack thereof) and discussion is given in Section 6.6.1.3. All data summaries in graph and map form are included in Appendix I.

Most differences were noted in length frequencies, those for some species favoring larger fish in the proposed sector exemption and existing habitat (EFH) areas. Most notable were the length frequencies for Georges Bank haddock, Georges Bank/Southern New England winter flounder, and Gulf of Maine cod.

6.6.1.1 Data and analysis

- Examining various biological characteristics of a wide array of species using survey data and a BACI[8] analytical approach is possible, but not in the allotted timeframe for Framework 48.

  Issues that would be addressed in a statistical approach include procedural sampling of fish on stations within survey strata that are themselves randomly sampled. Within each stratum on an annual survey, a fixed number of fish are randomly sampled to measure biological characteristics such as individual fish weight, maturity condition, and age generally within 5 cm categories. Thus length categories with fewer fish caught are more intensively sampled for their biological characteristics than fish in more common length categories. This on top of the stratified random sampling of strata complicates formal statistical analysis of differences in biological characteristics and interpretation of variance.

- A formal statistical approach is possible to determine if differences are significant (i.e. differences occur between areas and over time) and meaningful (i.e within areas, different responses to management occurred over time as compared with parallel differences that have arisen due to environmental change, e.g. climate variation), but not within the allotted timeframe for Framework 48.

- A qualitative comparison of the biological characteristics inside the proposed exemption areas, inside the EFH closed areas, adjacent to the existing year round groundfish closed areas, and in open fishing areas elsewhere is in most cases sufficient for making decisions for Framework 48. Routinely collected biological characteristics for common species include:

  - Individual fish length
  - Individual fish weight
  - Sex
  - Age
  - Spawning condition (maturation)
  - Stomach volume

- From these data, derived statististics include:

  - Length-weight relationships (i.e. are fish in closed areas more robust)
  - Length at age (i.e are fish in closed areas faster growers)
  - Proportion mature at age (are fish in closed areas early spawners)
  - Distributions of potential spawners (i.e. old, more fecund females)
  - Stomach volume vs. length (i.e. are fish in closed areas better fed)

- The annual spring, fall, and winter surveys provide broad-scale synoptic data to make valid comparisons for the US EEZ. Canadian data and other surveys or research may be informative with more investigation.

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8 A BACI analysis compares time trends in changes in abundance, biomass, or other characteristics inside a closed area compared to the same factors outside of the closed areas, one being a “control” and the other being a “treatment”.

- As an initial approach, the CATT summarized and evaluated the biological data routinely collected on a randomly drawn subset of measured fish on NMFS surveys. Biological measurement data were binned by location into four discrete management area types for comparative analysis. Further binning into discrete year round closed areas or stock area (Gulf of Maine vs. Georges Bank/Southern New England) is possible, at the expense of less data for comparative analysis. The analysis focused on the following species:

Table 62 - Finfish analyzed for comparative biological characteristics in year round groundfish closed areas.

Target species	Species with low ACLs, either target or non-target	Species of concern
Haddock	Cod	Barndoor skate
Pollock	Yellowtail flounder	Thorny skate
Redfish	American Lobster	Smooth skate
Monkfish		Atlantic wolffish
Winter Flounder		
Winter skate		
White hake		

- The absence of differences in characteristics should however be interpreted with caution. Enhanced productivity that might exist would be realized in catches that occur in adjacent areas, particularly for fish that experience greater amounts or frequency of seasonal migration. A benthic species like scallops would be expected to retain the characteristics of closed area management more than pelagic species like dogfish and bluefish, for example.

  Intensified fishing effort on the boundaries of closed areas might occur for two separate reasons. On one hand, the higher fishing effort along closed area boundaries might occur because it is simply a good area to fish and fishing effort has been displaced to the adjacent areas that remain open. On the other hand, lower mortality and growth of stocks in closed areas might increase CPUE along the boundaries, which is harvested more intensely by the fishery. This effect has been studied, is suspected to occur, but is difficult to reliably demonstrate.

- Spawning condition should not be over-interpreted. Spawning condition on surveys is based on visual examination of gonads by trained biologists, but have not been determined via histology. Subtle differences between spent and resting, for example, are sometimes subjective and vary with the experience of the fish cutter.

- The six panel tables and associated maps below provide graphical comparisons of biological characteristics for the above species. All data are from the spring, fall, and winter surveys since 2002 (10-11 years). Since the evaluation focuses on spawning and biological characteristics sometimes vary by sex, only data for female fish are analyzed.

  A parallel analysis could be done for the 10 years before 1994, but was not due to the abbreviated timeframe for Framework 48 analysis. Also the data could be analyzed by individual closure area, but was not due to the sheer volume of results that would be generated and due to the abbreviated timeframe for Framework 48 analysis.

The winter survey began in 1992 and was terminated in 2007 and does not survey the Gulf of Maine.

6.6.1.2 General observations

1. Exemption and habitat areas characteristically shelter large fish of some species
    a. Haddock, yellowtail flounder, winter flounder.
    b. Possibly cod.
    c. Not pollock, redfish, monkfish, winter skate, barndoor skate, thorny skate.

2. Since larger fish are more fecund, the areas have provided a spawning refuge for haddock, yellowtail flounder (included because of the high proportion of spawning females in Closed Area II), and winter flounder.

3. Larger cod in deep water appear to be offered protection from fishing in the EFH closed areas, in both spring and fall.

4. Larger white hake (plot not in this document) in shallower water appear to be be offered protection from fishing in the EFH closed areas, in the fall.

5. Detectible differences in productivity at size or age have been difficult to identify
    a. Few if any differences in maturity stage at age.
    b. Few if any differences in weight at length.
    c. Few if any differences in length at age.

6. Plots of stomach volume vs. length and length vs. depth by area type did not show many differences between areas. Data generally exhibited a wide variation and were unlikely to be significant. When differences seemed to be apparent, plots of length vs. depth by area were plotted and included in this report.

6.6.1.3 Comparative analysis of biological characteristics

The following descriptions below for species likely to be most affected by Framework 48 sector exemption areas summarize observable differences or lack of differences in the biological characteristics measured on the spring, fall, and winter NMFS trawl surveys. When suitable data are available (some species are not aged or there were no measured fish in a specific type of management area), a full set of graphs and maps are included in Appendix I. When the discussion below points out a notable characteristic for a species on one or more of these surveys, a graph or map may be included in the following descriptions as needed.

6.6.1.3.1 Haddock

Haddock are expected to be one of the primary target species while fishing in sector exemtion areas, particularly when fishing in Closed Area I and Closed Area II. Particularly in Closed Area II, haddock tend to be larger than in other areas and survey CPUE appears to be significantly higher than elsewhere. Conservation through closed areas appears to offer haddock lasting protection from fishing and larger haddock appear to exist in the existing EFH areas and in the sector exemption areas in both Georges Bank (Figure 30) and in the Gulf of Maine (Figure 31). Greater proportions of larger haddock occur in these areas than elsewhere.

Figure 30 - Comparative length frequencies of female Georges Bank haddock during 2002-2012 spring surveys.

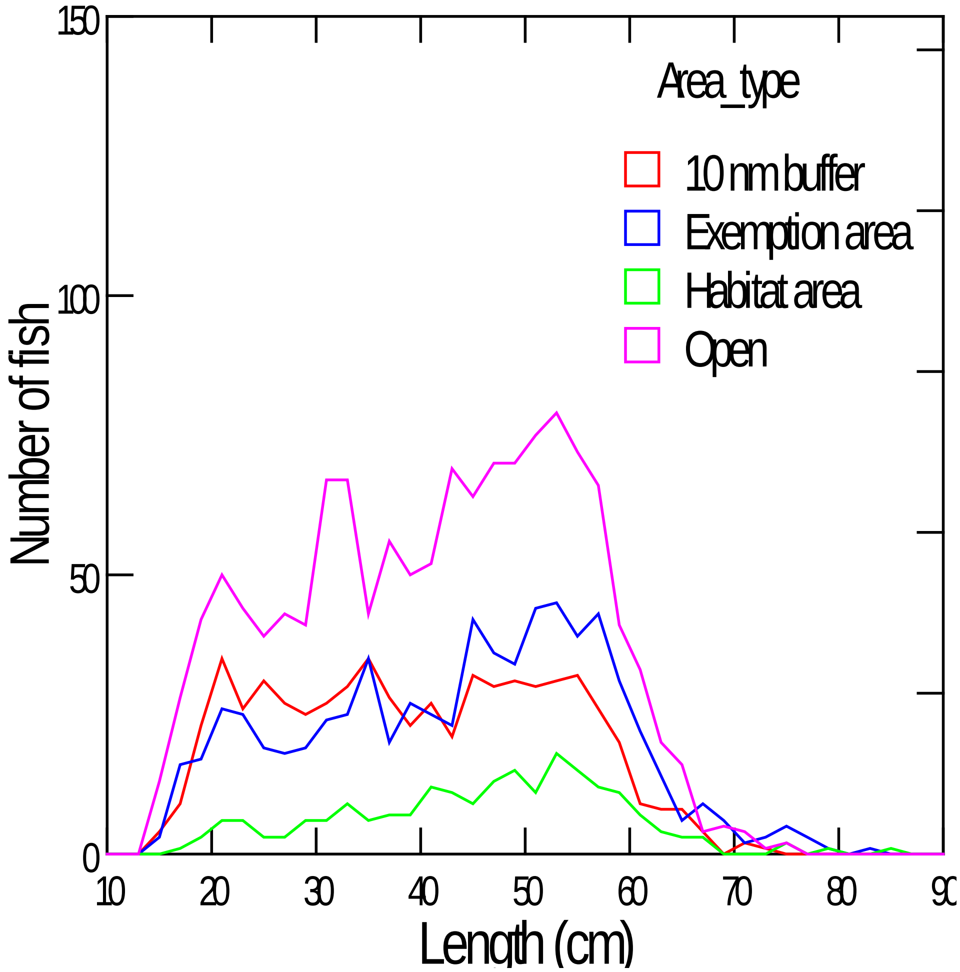
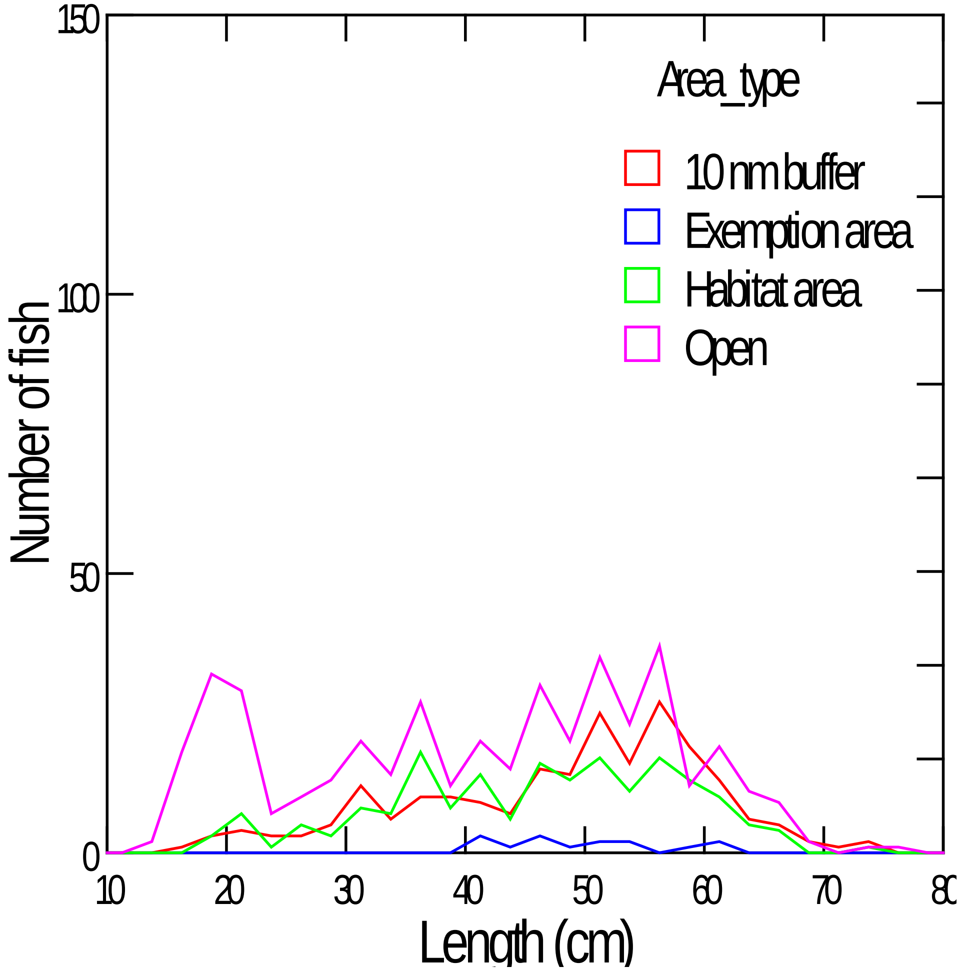


Figure 31 - Comparative length frequencies of female Gulf of Maine haddock during 2002-2012 spring surveys.



This observation based on analysis of NMFS trawl survey data is supported from the results of Kerr et al (2012), which found that the Western Gulf of Maine Area, Closed Area I, and Nantucket Lightship Area closures had a significant positive effect on haddock biomass. Kerr et al. however did not find significant positive effects for haddock in Closed Area II, despite the large amounts of haddock biomass that occurs there. In fact, although “CAII was originally designed to protect haddock spawning and the results of the BACI analysis indicate it was not effective at enhancing the productivity of this species. No significant positive impacts of this closure (location:period interactions) were detected with respect to the probability of occurrence of haddock in survey tows or survey catch (number) and catch (weight) per tow. However, a significant negative effect of the closure was detected, wherein catch (number) per tow of haddock was significantly higher outside-after closure.”

Closer examination of the spring survey data, however, reveals that this result may be due to the behavior and distribution of year classes in and around Closed Area II, particularly for the strong 2000 and 2003 year classes. At age 5, a fairly high (i.e. ~40%) fraction of haddock were sampled on tows in Closed Area II (Cod HAPC and the proposed sector exemption areas; see Figure 41). Generally the proportions for the 2001, 2002, and 2004 year classes should be ignored due to low sample size.

By age 6, the proportions of haddock in Closed Area II usually increased for stronger year classes compared to age 5, i.e. age 6 fish were afforded more protection by the area closure due to changes in distribution (or removals of age 5 and 6 haddock in open fishing areas (open and 10 nm buffer around Closed Area II).

The proportion of age 7 haddock in Closed Area II however declines, i.e. a greater fraction of haddock were observed in the spring survey from tows in open fishing areas, particularly for the 2003 and 2005 year classes (in 2010 and 2012, respectively). The propotion of age 7 haddock from the strong 2003 year class declined to 27% from 57% in the prior year, and then declined again to 15% at age 8 in 2011. Whether this result is due to dispersal of large fish or due to fishing in the Haddock SAP (via catch or induced changes in fish distribution) is difficult to say with the analysis at this stage. Either way, it helps explain why the Kerr et al. results for Closed Area II haddock were insignificant – the older haddock from the strong 2003 year class were either caught or disbursed to other areas open to fishing (or Canada, also open to fishing).

Although the survey data analyzed here, by Kerr et al., and in Section 6.6.2 (CPUE and swept area analysis) indicate that haddock tend to be larger in the proposed exemption areas than in the open fishing areas, differences in haddock biological characteristics are difficult to identify in the spring, fall, and winter (Georges Bank only) surveys.

Summaries of biological sample data from the 2003-2012 spring, 2002-2011 fall, and 2002-2007 winter trawl surveys are provided in Tables 1-3 in the Appendix I. Selected examples of notable results are given in the summary below, but the reader is referred to the complete suite of biological data summaries from these surveys in the appendix. Although included in this analysis, the winter survey haddock data (see Appendix I) provide little useful information to analyze the effectiveness of the year round groundfish closed areas.

The length weight relationships of individual measured haddock do not appear to be different in the proposed exemption areas and habitat (i.e. EFH closure) areas compared to open fishing areas (Figure 32 and Figure 33). Larger haddock in the currently closed areas do not appear to have different length-weioght relationships than haddock caught elsewhere.

Figure 32 - Length-weight relationships by management area type for Georges Bank female haddock during the 2002-2012 spring surveys.

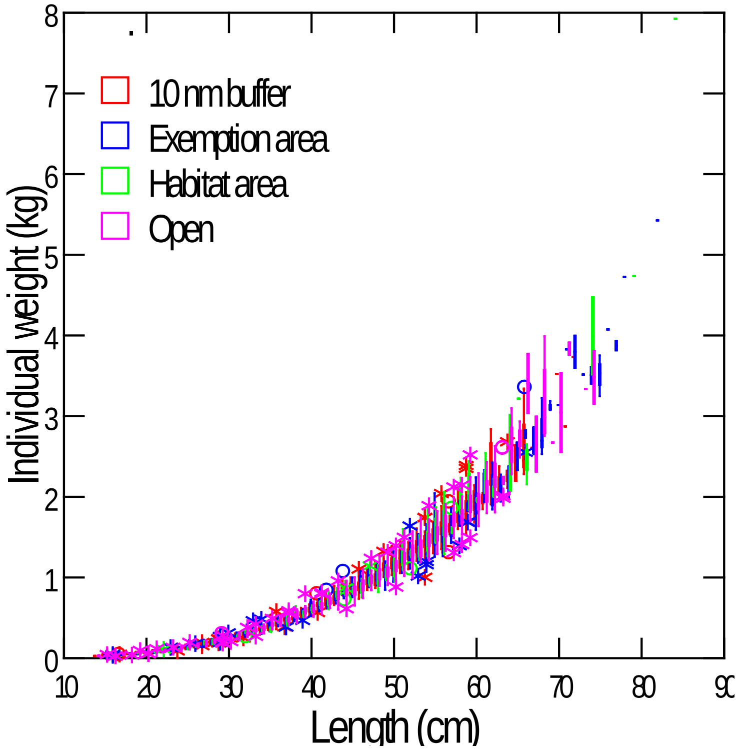
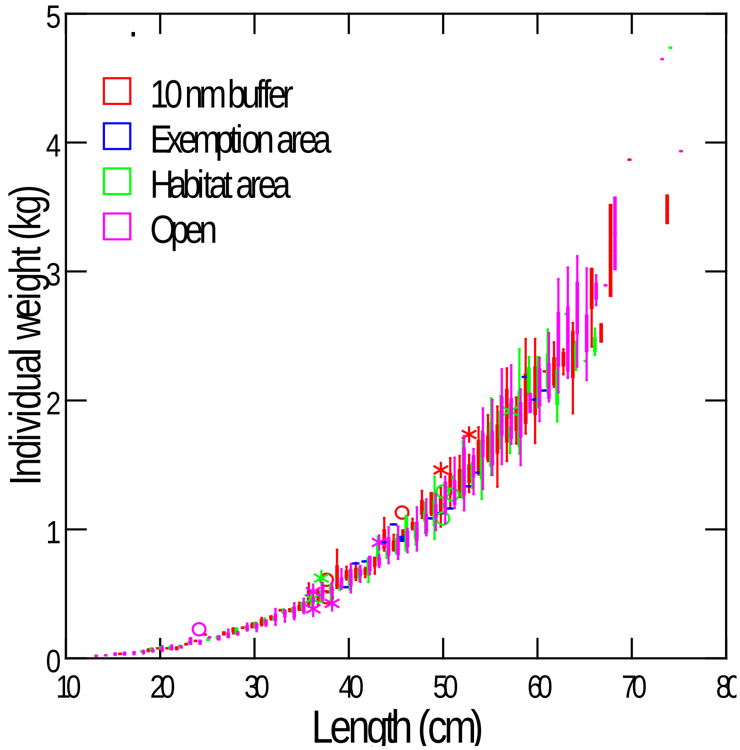


Figure 33 - Length-weight relationships by management area type for Gulf of Maine female haddock during the 2002-2012 spring surveys.



Likewise, the lenghs at age do not show a clear trend toward larger fish in either the exemption areas or the habitat (EFH) areas compared to open fishing areas of either Georges Bank or in the Gulf of Maine (See Figure 34 and Figure 35, for example). Points falling on the line of one to one correspondence indicate that the lengths at age are identical. Points falling above the line indicate that the haddock in the exemption areas or habitat areas are larger than those at the same age in open fishing areas, and vice versa. Since there did not appear to be an observable and consistent difference in length at age, no formal statistical testing was attempted.

Figure 34 - Comparison of Georges Bank female haddock lengths at age between proposed those caught in the proposed sector exemption areas and those caught in currently open fishing areas during the 2003-2012 spring trawl surveys.

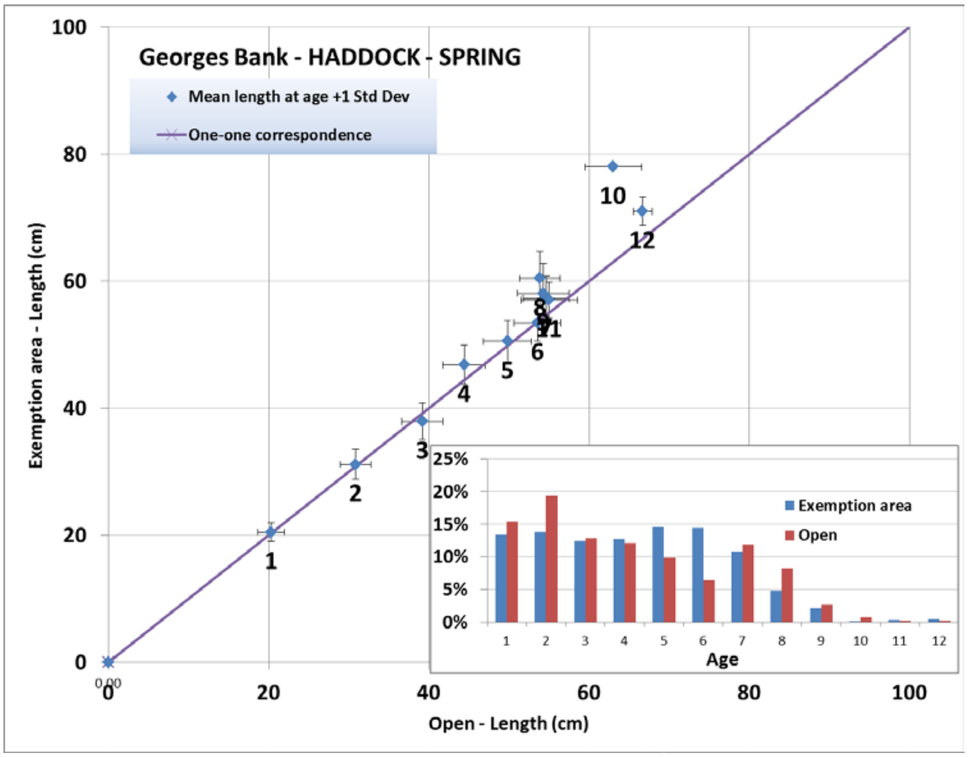
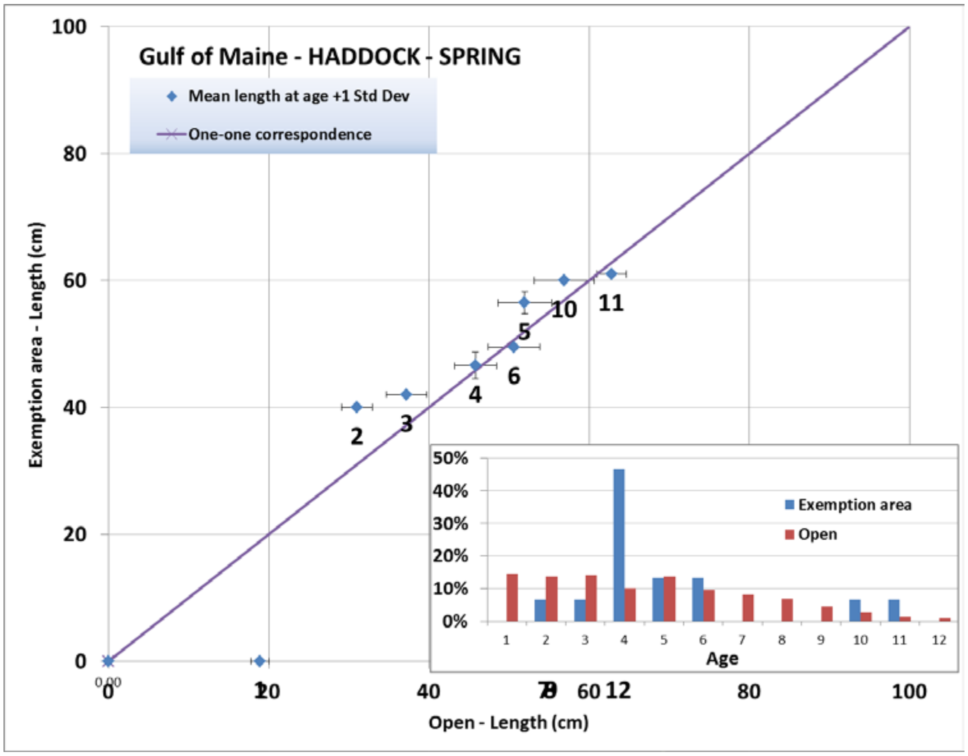
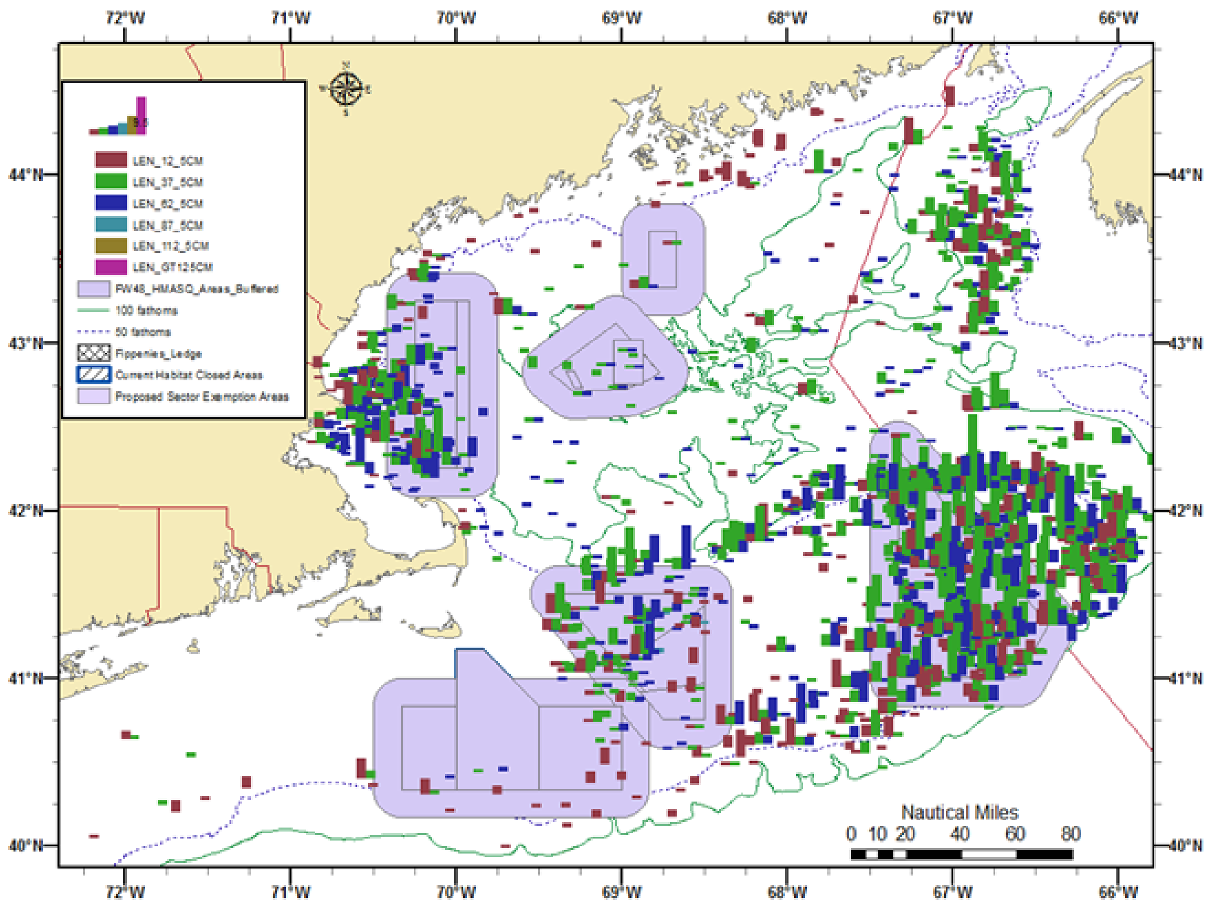


Figure 35 - Comparison of Gulf of Maine female haddock lengths at age between proposed those caught in the proposed sector exemption areas and those caught in currently open fishing areas during the 2002-2012 spring trawl surveys.



Larger haddock appear to be widely distributed across the eastern part of Georges Bank, particualrly in Closed Area II and in Canadian waters (Figure 36), during the spring survey. Haddock elsewhere tend to be smaller, whether on the western part of Georges Bank or in the Gulf of Maine. Most of the haddock captured in the spring survey are inshore and to the west of the Western Gulf of Maine area, or in its SW corner. During the fall, most of the larger haddock are distributed along the northern edge of Georges Bank in US and Canadian waters (Figure 36). Despite the differences in length and depth frequency, differences in length at depth in the spring (Figure 38) and fall surveys are not apparent.

Figure 36 - Geographical distribution of female haddock length frequency during the 2003-2012 spring trawl surveys.



In contrast to the spring survey data, the smaller haddock in the fall occupy the shallower portions of Georges Bank, the Great South Channel, and Massachusetts Bay (Figure 37). Larger haddock (i.e. > 30 cm) occupy deeper water along the northern edge of Georges Bank, which overlaps the Cod HAPC and Closed Area II north of the HAPC, and in the northern part of Closed Area II which is also a habitat closed area. Larger haddock also were found in the habitat closed area that overlaps the Western Gulf of Maine area, but few haddock were observed in the fall within the proposed sector exemption area of the Western Gulf of Maine area.

Figure 37 - Geographical distribution of female haddock length frequency during the 2002-2011 fall trawl surveys..

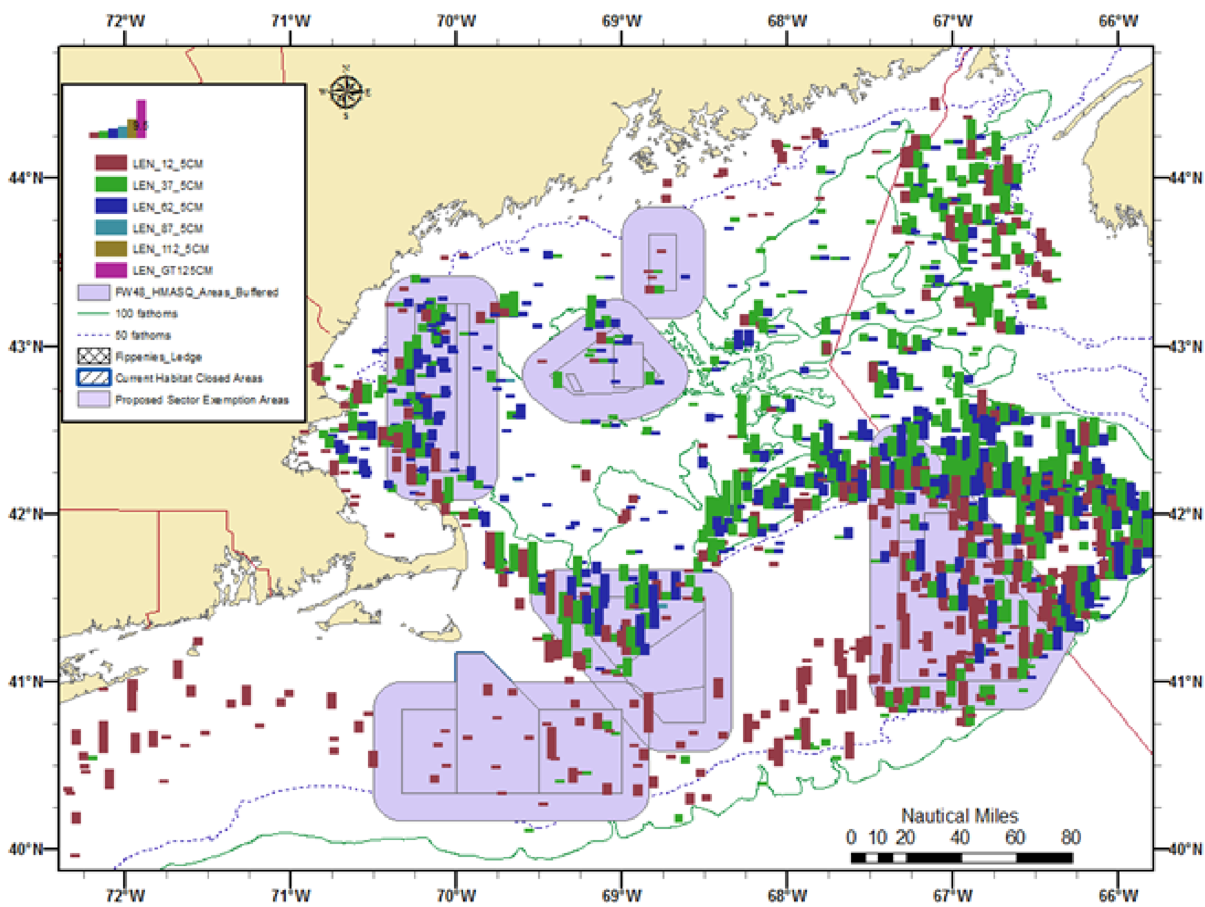
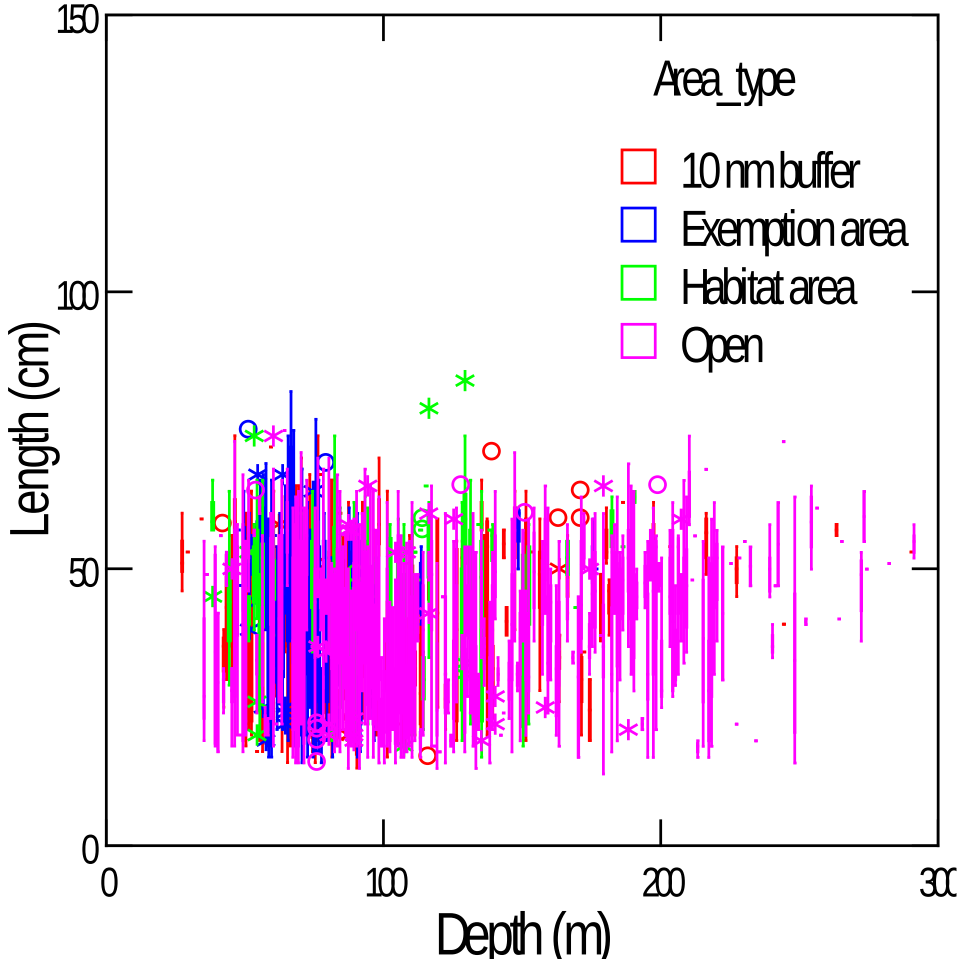
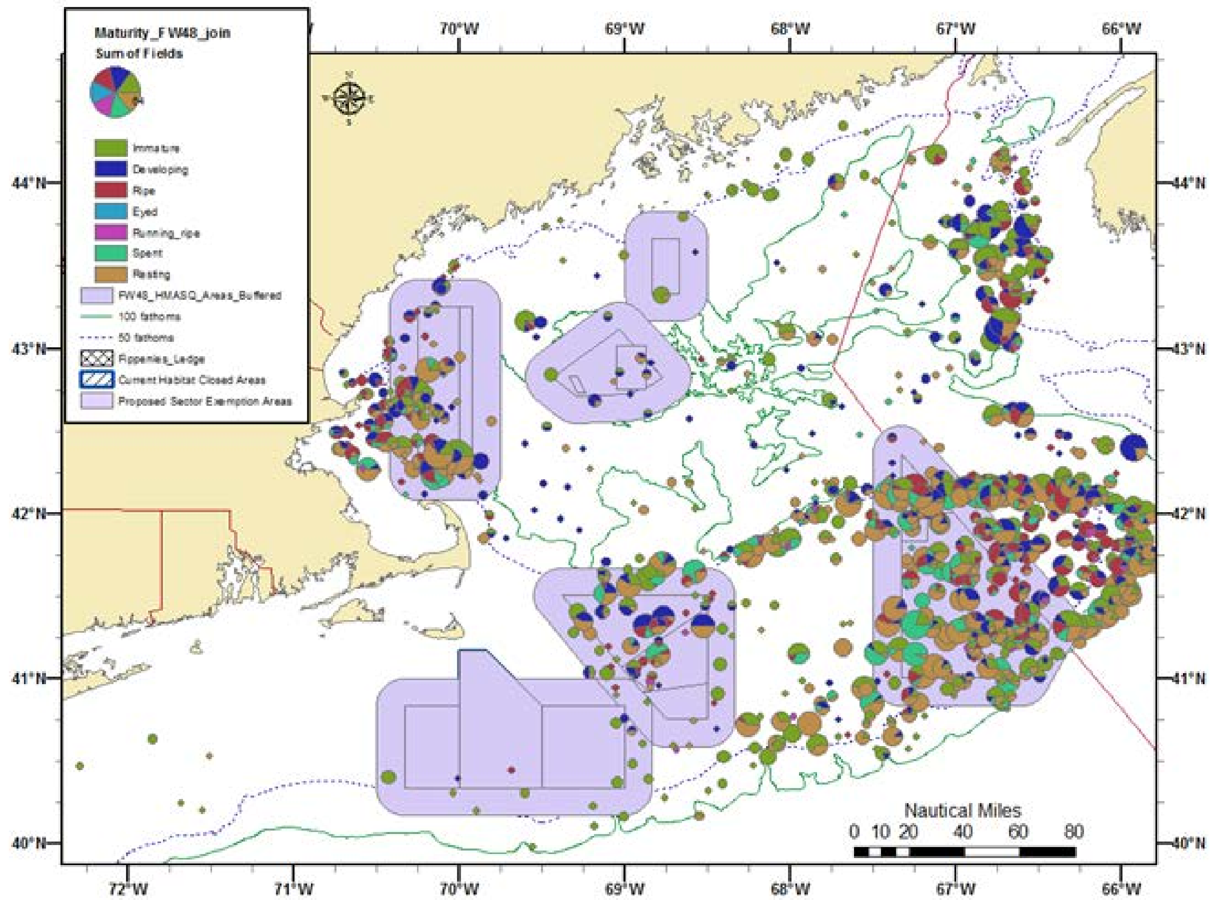


Figure 38 - Box-whisker plot of length vs depth by management area type for Georges Bank female haddock during the 2002-2012 spring surveys.



During the spring when haddock spawning occurs, the distibution of ripe female haddock is concentrated in the shallower portions of the northern and central portion of Closed Area II, in Canada, and near Stellwagen Bank and sothern Jeffries Ledge, inshore of the Western Gulf of Maine area (Figure 39). Relatively few female haddock in the spring were observed from tows near or withing the Cashes Ledge or the Jeffries Bank Areas.

Figure 39 - Geographical distribution of female haddock maturity stages during the 2003-2012 spring trawl surveys.



The largest female haddock (i.e. age 8+), appear to be fairly widely distibuted, but found mainly in the closed areas (Closed Area I, Closed Area II, and Western Gulf of Maine areas) or in Canada (Figure 40). A notable portion of the largest female haddock in the spring are found in open fishing areas, west of the Western Gulf of Maine area.

Figure 40 - Geographical distribution of 8+ female haddock during the 2003-2012 spring, 2002-2011 fall and 2002-2007 winter trawl surveys.

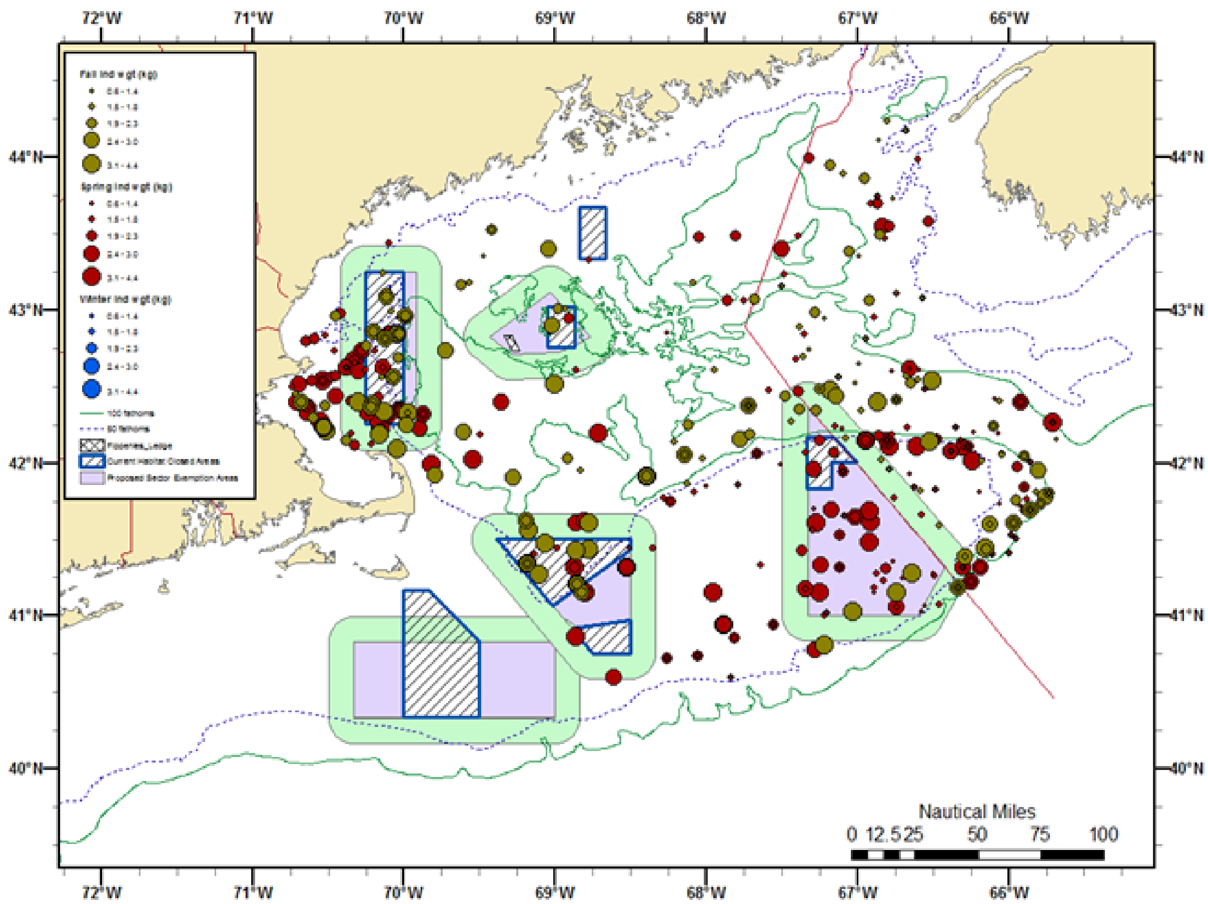


Figure 41 - Year class strength and percent of aged haddock in spring survey samples by management area and year class.

6.6.1.3.2 Pollock

Unlike haddock (above) and cod (below), the size frequencies of female pollock do not indicate that the closed areas provide substantial protection from fishing pressure, possibly due to greater seasonal movement in and out of the closed areas. The length frequencies of female pollock on Georges Bank (Figure 42) show proportionally fewer large fish in open fishing areas compared with a 10 nm buffer around the closed areas or in the habitat areas. No pollock were measured in the proposed sector exemption areas. The length frequency distribution of pollock in the Gulf of Maine (Figure 43) is even less convincing that closed areas provide substantial protection from fishing.

Figure 42 - Comparative length frequencies of female Georges Bank pollock during 2002-2012 spring surveys.

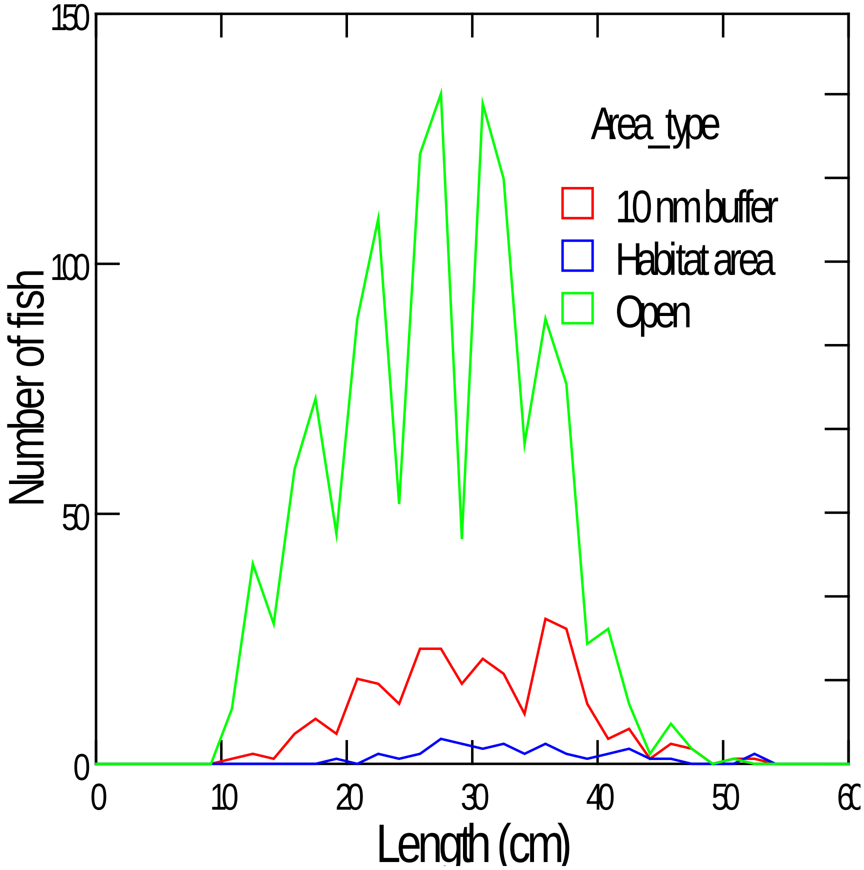
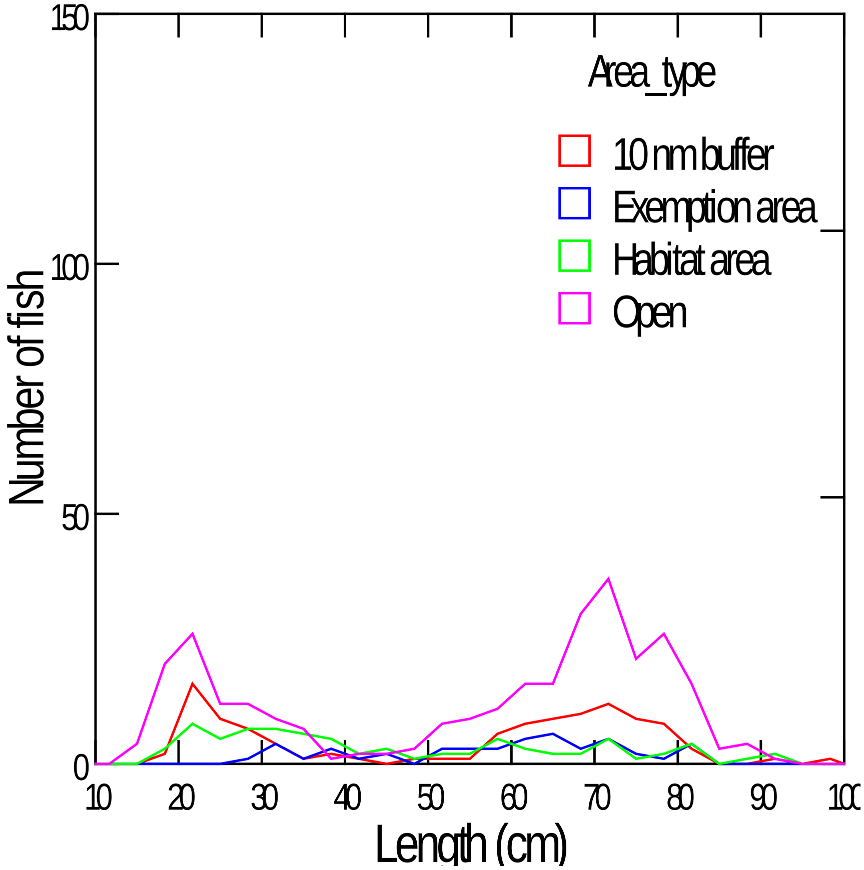
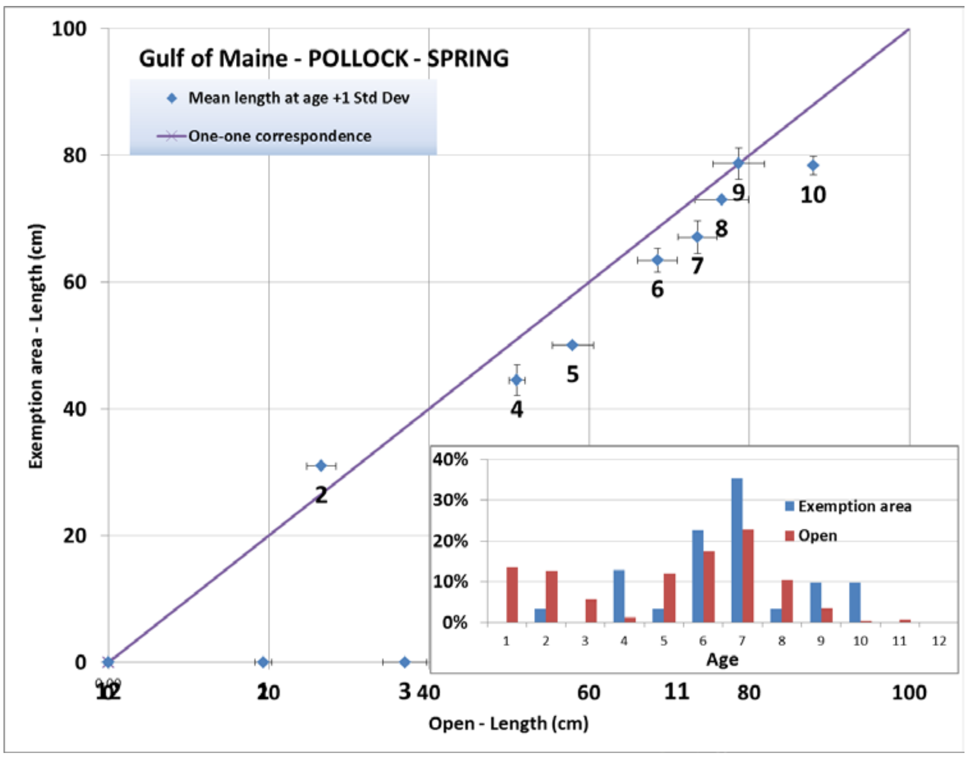


Figure 43 - Comparative length frequencies of female Gulf of Maine pollock during 2002-2012 spring surveys.



Most of the measured biological characteristics of pollock on Georges Bank or in the Gulf of Maine, spring or fall, do not show any notable differences. The one exception found by this analysis is that for unknown reasons, ages 4 to 7 female pollock in the proposed sector exemption areas of the Gulf of Maine appear to be slower growers than those found in open fishing areas (Figure 44). This may be due to different growth rates at depth or some other factor yet to be determined.

Figure 44 - Comparison of female Gulf of Maine pollock lengths at age between proposed those caught in the proposed sector exemption areas and those caught in currently open fishing areas during the 2002-2012 spring trawl surveys.



Old (age 6+) pollock were sampled from a wide distribution throughout the deeper areas of the Gulf of Maine and Canada during both the spring and fall surveys (Figure 45). Developing female pollock were more frequently observed in the northern and eastern part of the Western Gulf of Maine area, including the proposed sector exemption area during the fall survey (Figure 46).

Figure 45 - Geographical distribution of 6+ female pollock during the 2003-2012 spring, 2002-2011 fall and 2002-2007 winter trawl surveys.

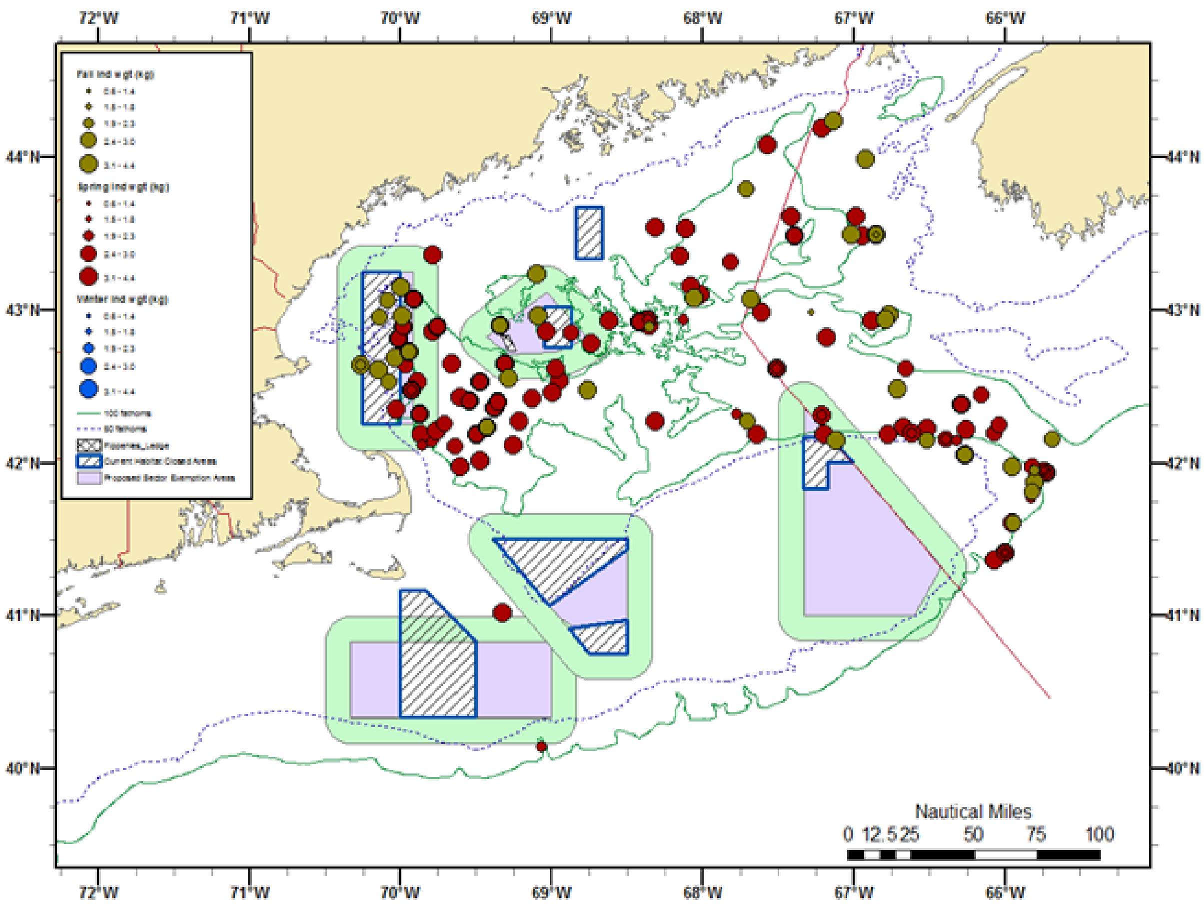
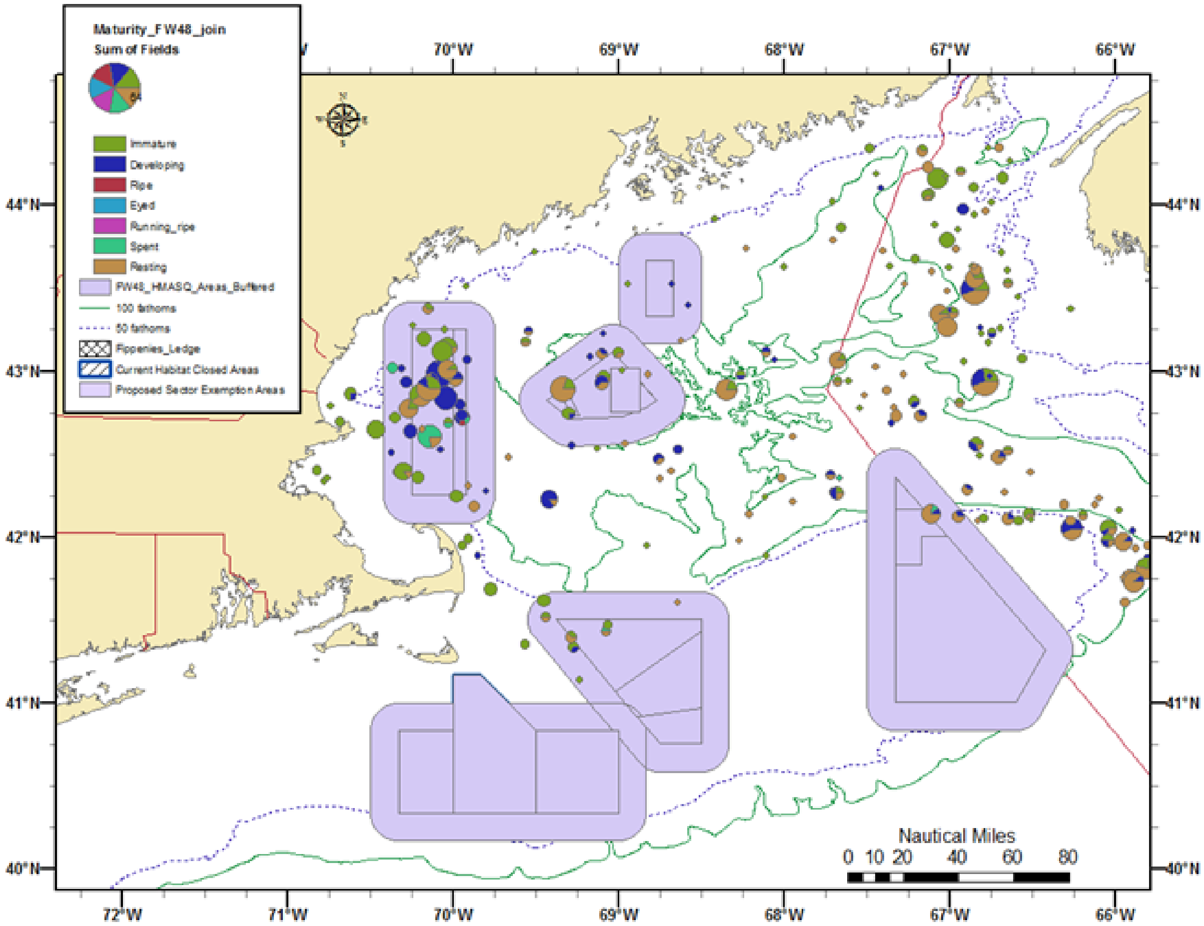


Figure 46 - Geographical distribution of female pollock maturity stages during the 2002-2011 fall trawl surveys.



6.6.1.3.3 Redfish

Few differences in length frequencies or biological characteristics in the spring and fall survey data were observed in this analysis. Redfish are broadly distributed in the deeper waters of the Gulf of Maine and Canada during both the spring and fall. Developing and ripe female redfish are widely distributed in the spring (Figure 47) , with notable concentrations of immature redfish occupying areas overlapping the Western Gulf of Maine area, including both the existing habitat area and the proposed sector exemption area. The length distributions of female redfish (Figure 48) favor larger fish (e.g. > 30 cm) in the proposed exemption areas and the 10nm buffer around the closed areas; and smaller fish (e.g. < 25 cm) in he existing habitat areas in the spring.

Figure 47 - Geographical distribution of female redfish maturity stages during the 2003-2012 spring trawl surveys.

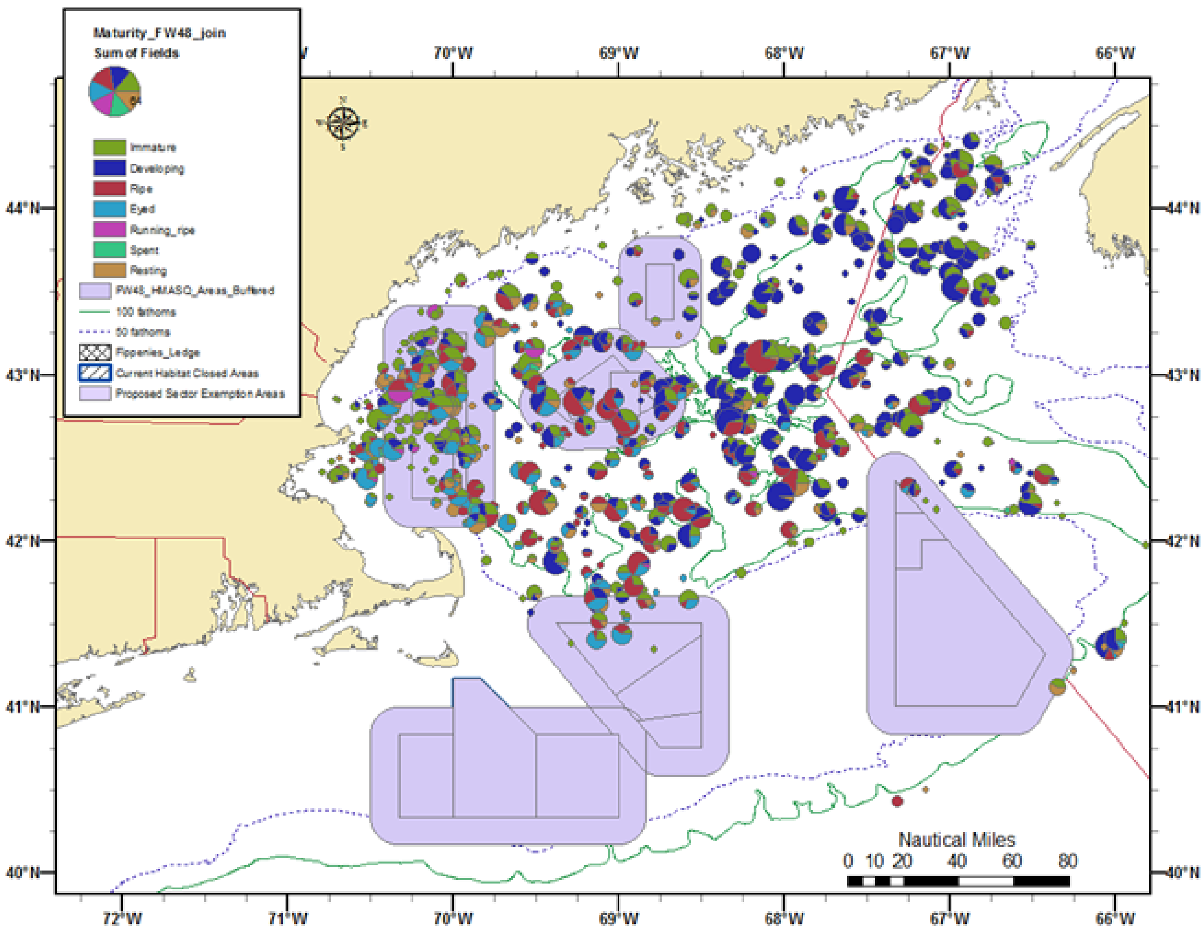
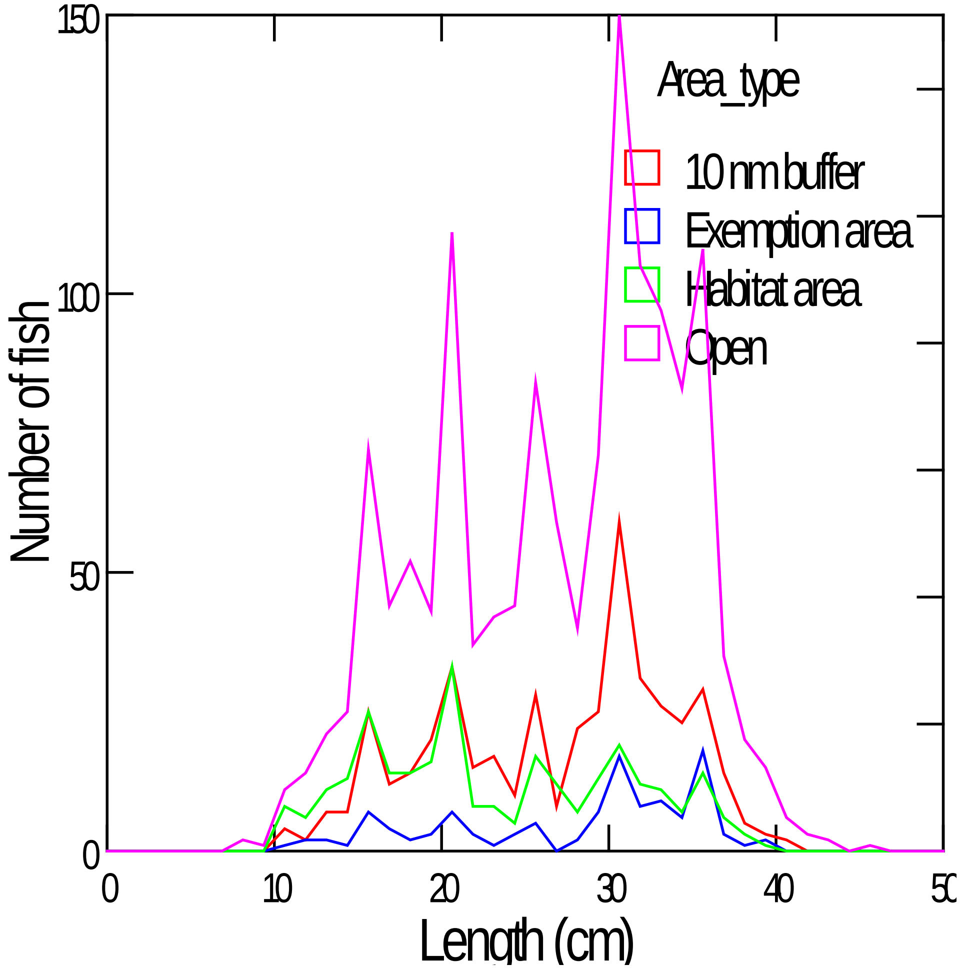
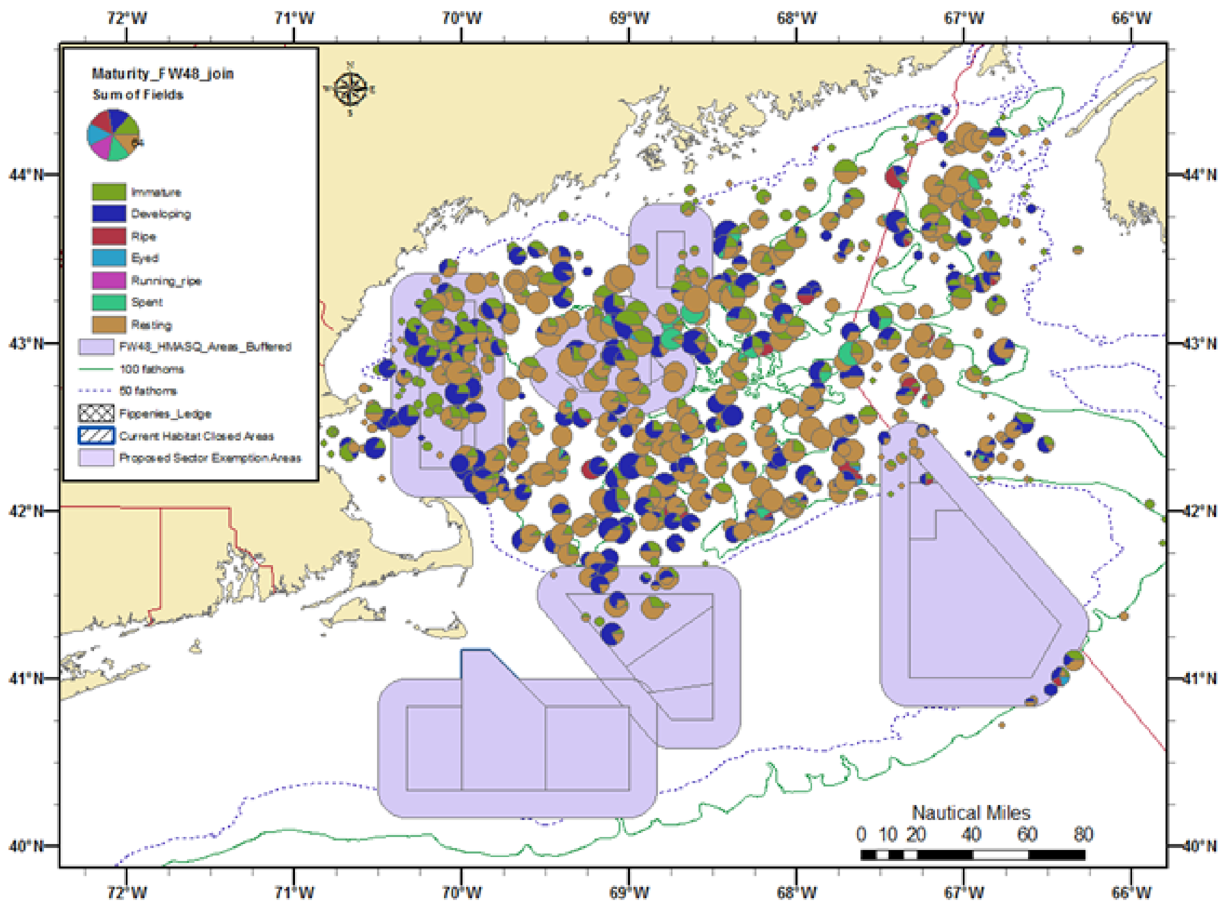


Figure 48 - Comparative length frequencies of female Gulf of Maine redfish during 2002-2012 spring surveys.



There appear to be fewer ripe female redfish sampled by the fall survey (Figure 49), with notable concentrations of immature redfish around the northern part of the Western Gulf of Maine and Cashes Ledge areas. Differences in the length distributions of female redfish by type of management area in the fall were not discernable, either for Georges Bank or Gulf of Maine strata.

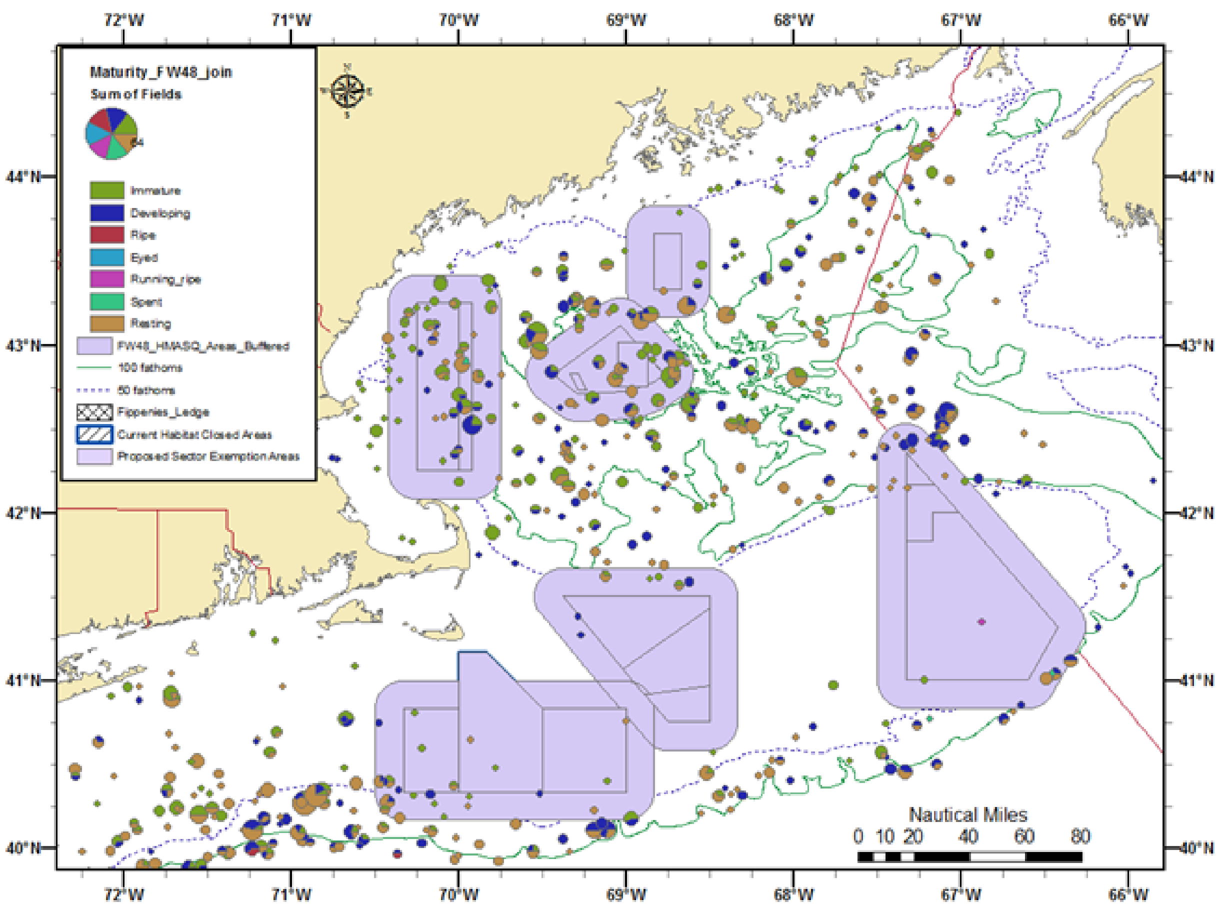
Figure 49 - Geographical distribution of female redfish maturity stages during the 2002-2011 fall trawl surveys.



6.6.1.3.4 Monkfish

The survey has encountered few monkfish in the proposed sector exemption areas or the exisitng habitat areas of Georges Bank. There have been some monkfish in the Nantucket Lightship Area during the fall (Figure 50) and winter surveys, but most of the monkfish occur in open fishing areas.

Figure 50 - Geographical distribution of female monkfish maturity stages during the 2003-2012 spring trawl surveys.



Monkfish occupy a broad area of deep water in the Gulf of Maine, including the Western Gulf of Maine and Cashes Ledge closed areas, but generally the concentrations of monkfish in these areas is not exceptional. One possible exception is the central part of the Western Gulf of Maine sector exemption area in the spring survey (Figure 51). Here the survey encountered a mix of developing and immature monkfish. Otherwise the monkfish biological characteristics (weight-length, length at age, maturity) are unremarkable. Even the length frequencies of monkfish in the existing habitat areas and the proposed sector exemption areas do not exhibit noticeable differencies in the relative abundance of large monkfish (Figure 52).

Figure 51 - Geographical distribution of female monkfish maturity stages during the 2002-2011 fall trawl surveys.

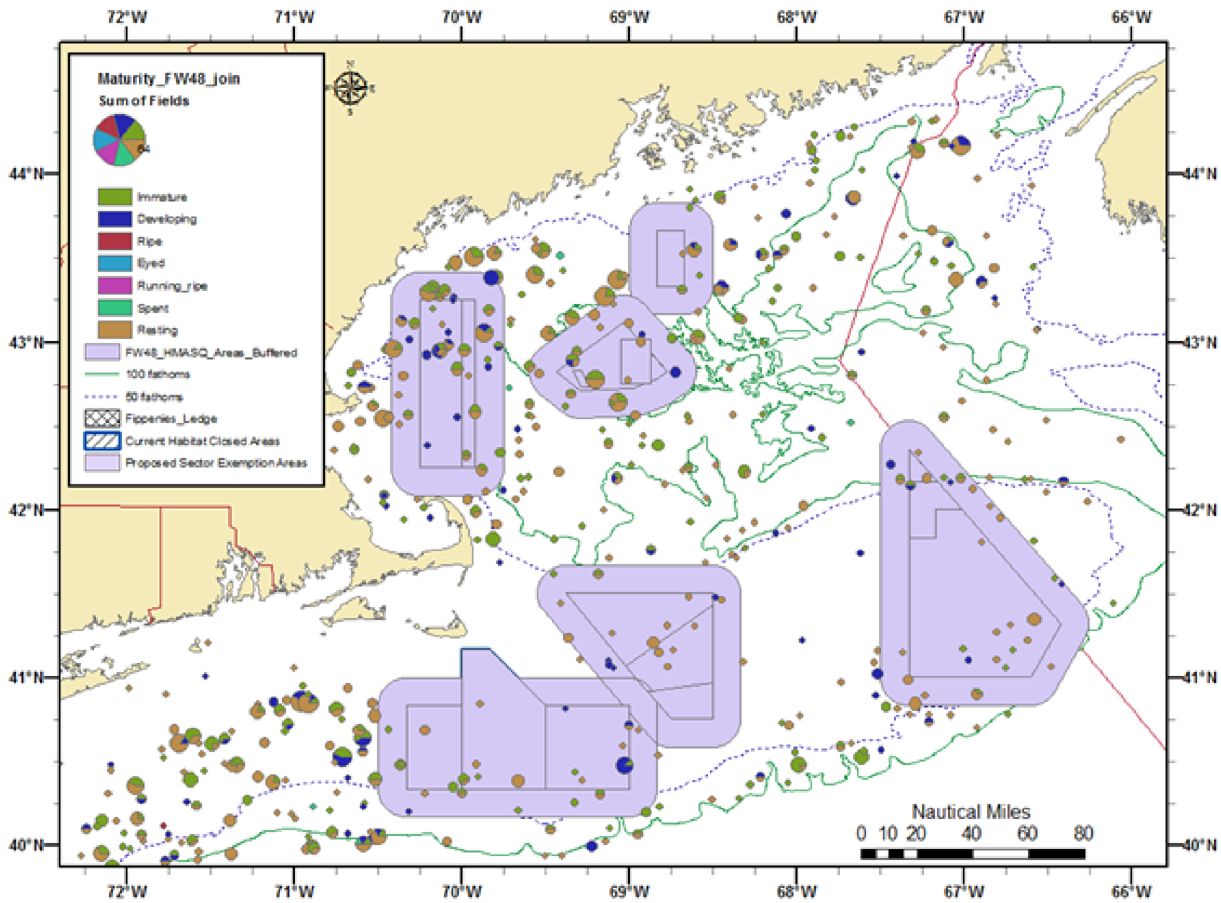
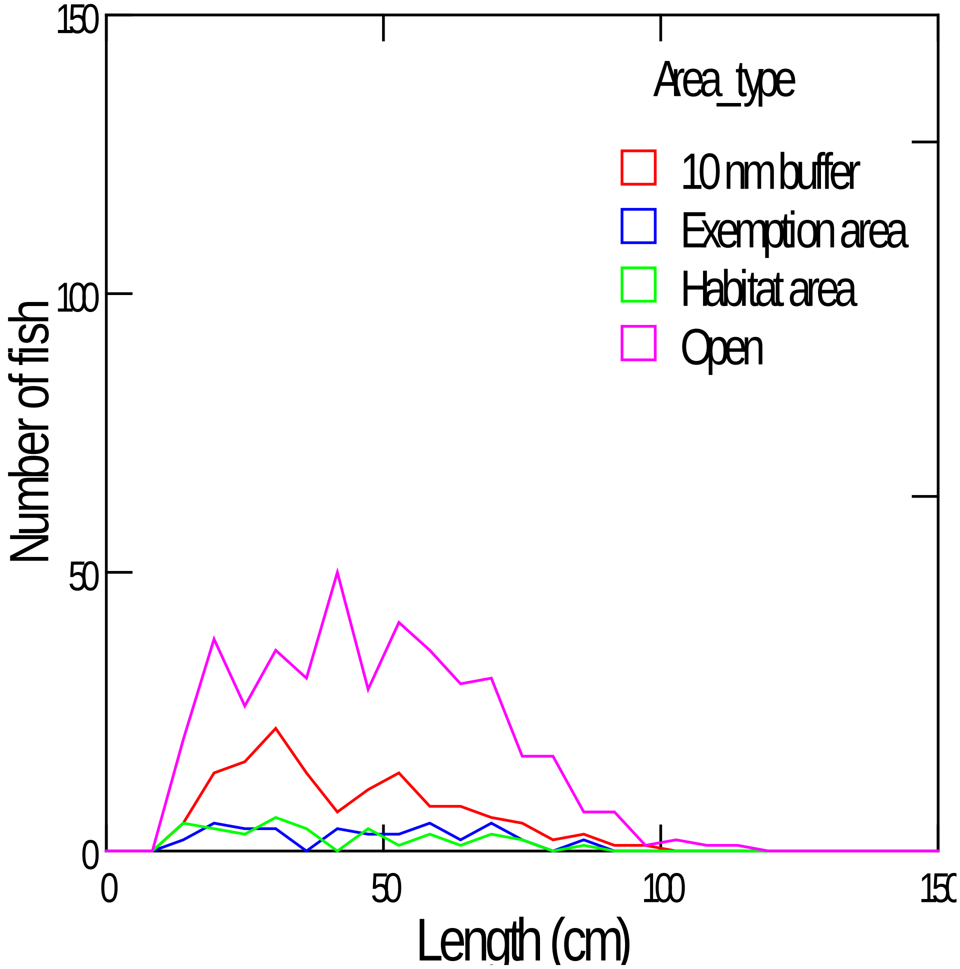


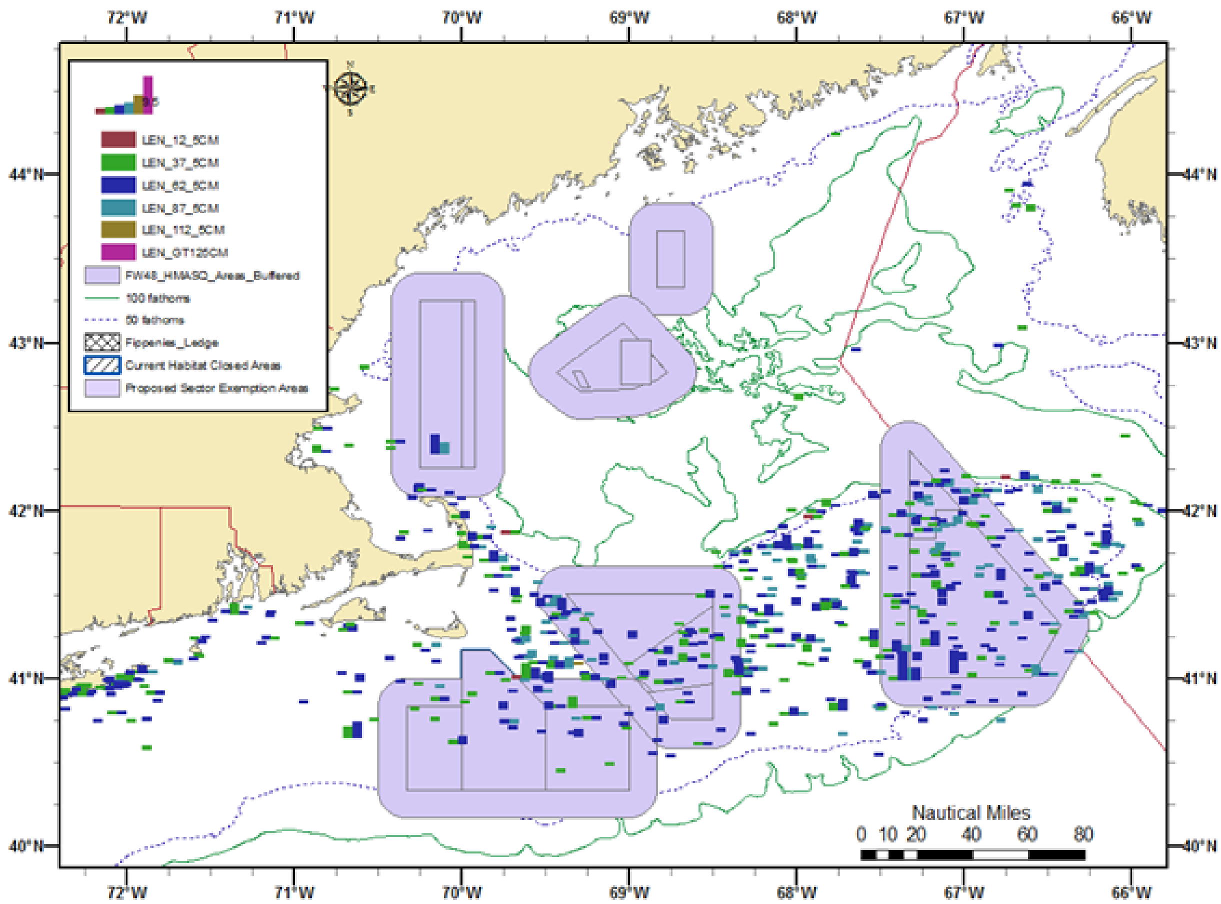
Figure 52 - Comparative length frequencies of female Gulf of Maine monkfish during 2002-2012 spring surveys.



6.6.1.3.5 Winter skate

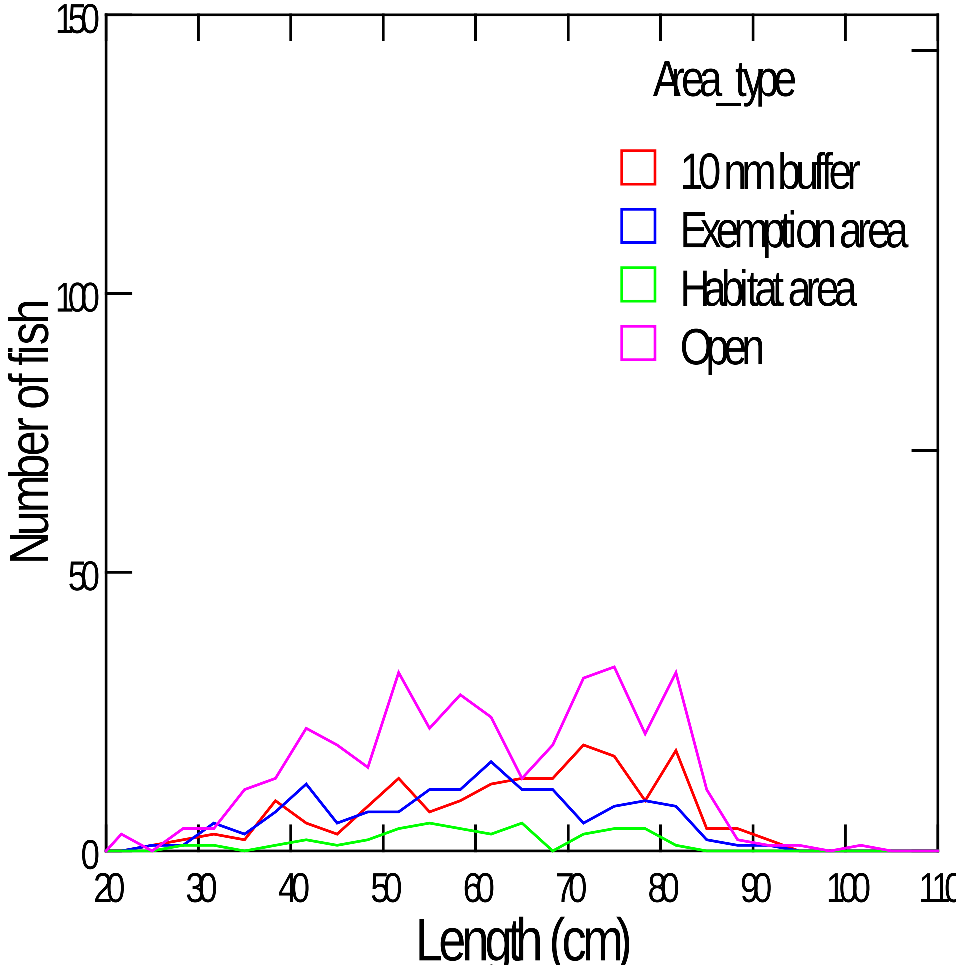
Winter skate are a primary target species for some vessels in the groundfish fleet, using trawls and particularly gillnets. Winter skate captured in the spring and fall (Figure 53) trawl surveys are widely distributed across Southern New England, Georges Bank, and the southern part of the Gulf of Maine. In the Gulf of Maine, few winter skate were observed in the Western Gulf of Maine or Cashes Ledge areas, however.

Figure 53 - Geographic distribution of winter skate length frequencies during 2002-2012 fall surveys.



Winter skate on Georges Bank were observed in all three year round closed areas, but their size distribution (Figure 54) and other biological characteristics in these areas is unremarkable. Winter skate are routinely sampled for length, weight, and maturity, but are not aged.

Figure 54 - Comparative length frequencies of female Georges Bank winter skate during 2002-2011 fall surveys.



6.6.1.3.6 Atlantic cod

Summaries of biological sample data from the 2003-2012 spring, 2002-2011 fall, and 2002-2007 winter trawl surveys are provided in Tables 14-16 in Appendix I. Selected examples of notable results are given in the summary below, but the reader is referred to the complete suite of biological data summaries from these surveys in the appendix. Although included in this analysis, the winter survey cod data (see Appendix I) provide information pertaining only to the Nantucket Lightship Area compared to the open fishing areas of Southern New England and the Great South Channel.

Like some other species, year round groundfish closed areas appears to provide some added protection to cod. Female cod in the sector exemption and existing EFH areas in both Georges Bank (Figure 55) and the Gulf of Maine (Figure 56) are larger than in either the currently open fishing areas or in a 10 nm buffer around the closed areas, a region that is often more intesively fished than elsewhere. This length frequency difference is most noticeable in the spring survey data, than in the fall survey data (Figure 57, for example) when cod may be more dispersed.

Figure 55 - Comparative length frequencies of female Georges Bank cod during 2002-2012 spring surveys.

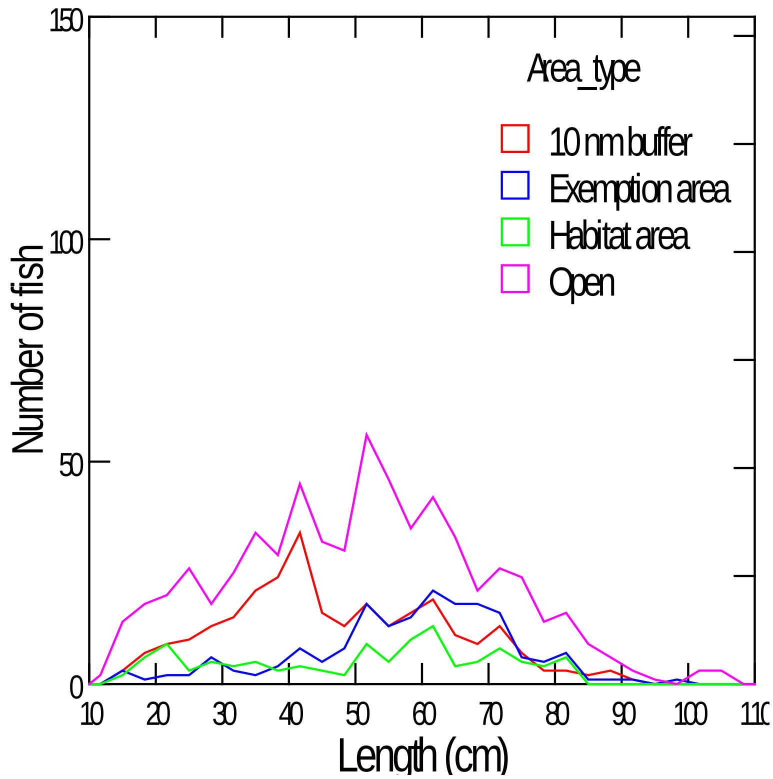


Figure 56 - Comparative length frequencies of female Gulf of Maine cod during 2002-2012 spring surveys.

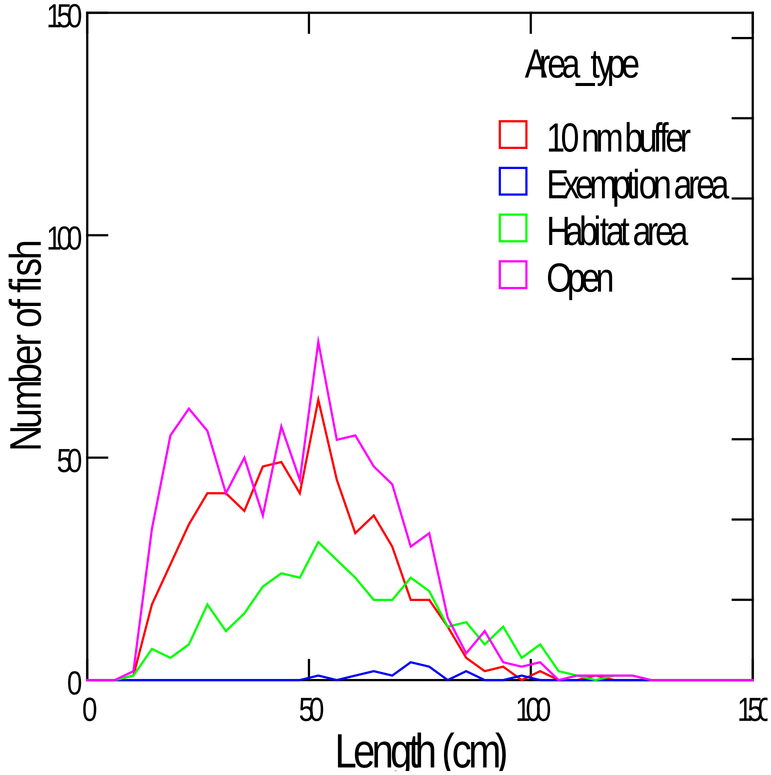
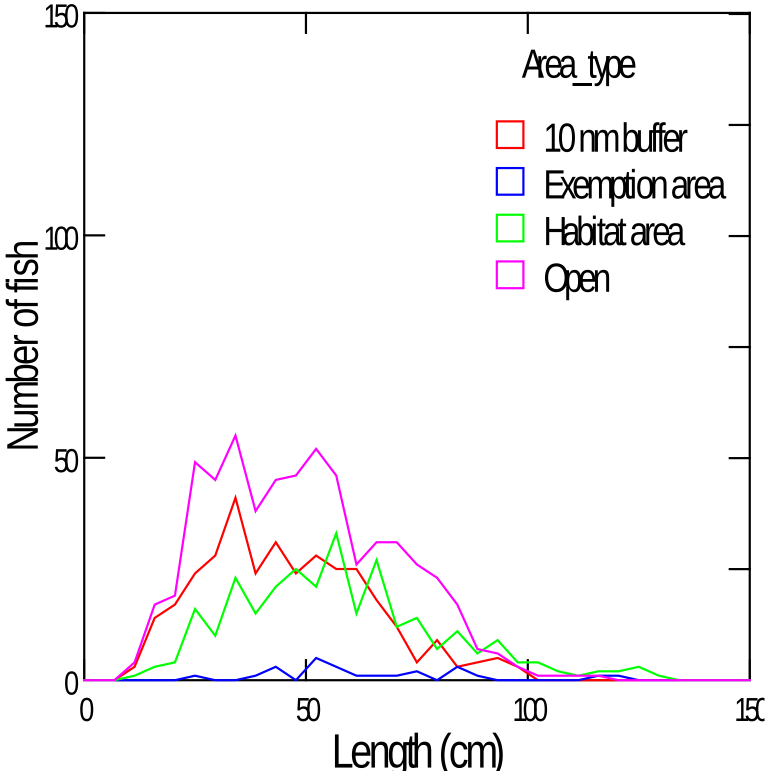


Figure 57 - Comparative length frequencies of female Gulf of Maine cod during 2002-2011 fall surveys.



In the spring (see Figure 58, for example), larger cod appear in the proposed sector exemption area and in the existing habitat area (mostly Closed Area I) at greater depth (140-160 m) than found elsewhere, particularly in the open fishing areas. This result for the existing habitat area is also apparent in the fall survey. There appears to be a wide variation in the data however and this observation may or may not be significant without formal statistical testing. At shallower depths, there appar to be fewer differnces in lengths at depth between types of management areas. Other than the above differences in size frequency, there do not appear to be any noticeable differences in lenghth-weight relationships of female cod by type of management area, either on Georges Bank or in the Gulf of Maine (Figure 59), spring or fall.

Figure 58 - Box-whisker plot of length vs depth by management area type for Georges Bank female cod during the 2002-2012 spring surveys.

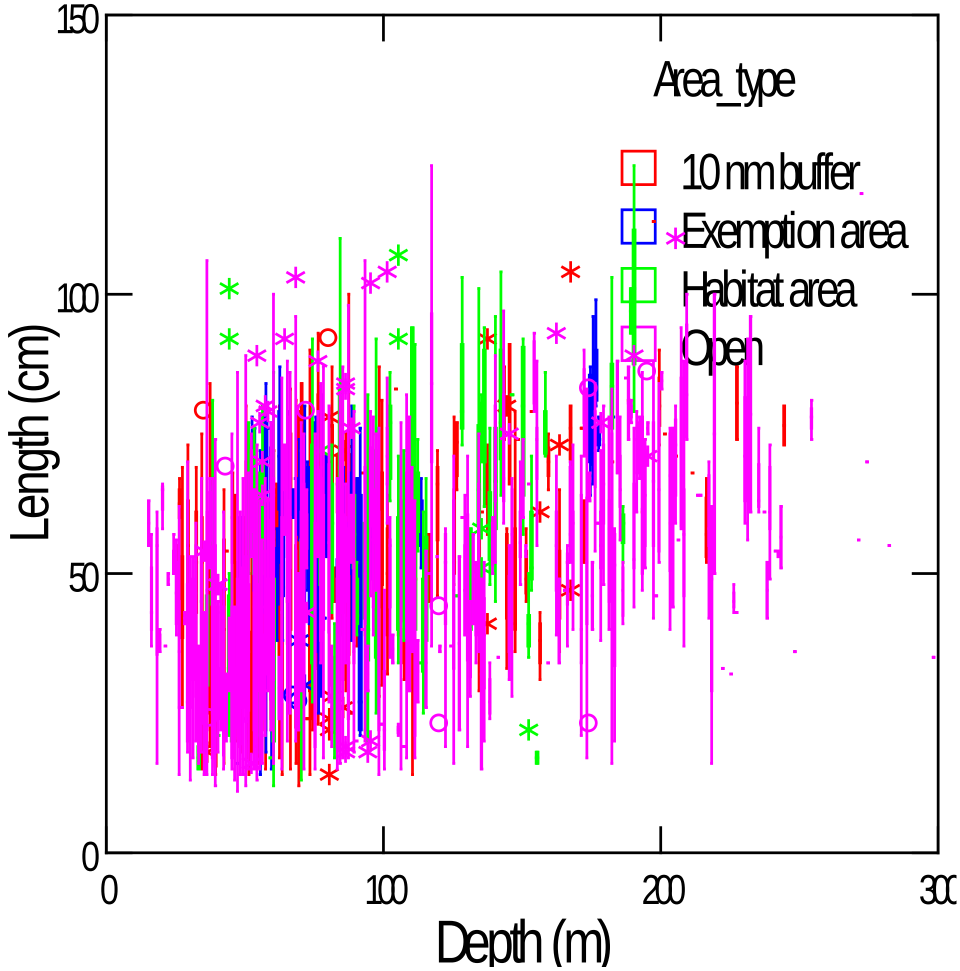
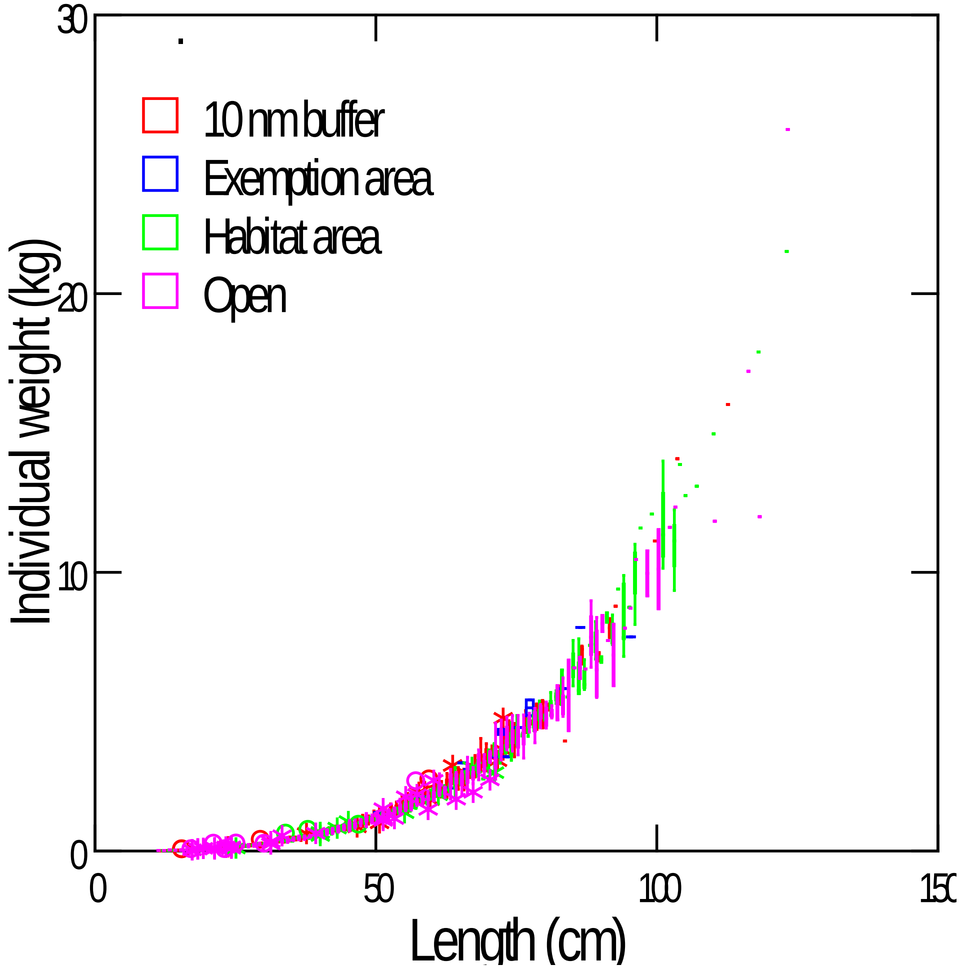


Figure 59 - Length-weight relationships by management area type for Georges Bank female cod during the 2002-2012 spring surveys.



Differences in other biological characterics are however less apparent. There are no apparent differences in mean weight at age in the exemption areas (Figure 60) or the habitat areas (Figure 61) in the spring data from the Georges Bank, except for the apparent smaller size of ages 7 and 8 inside these areas. The age 7 and 8 means and variances are affected by low sample size, however, and should be interpreted cautiously.

Figure 60 - Comparison of Georges Bank female cod lengths at age between proposed those caught in the proposed sector exemption areas and those caught in currently open fishing areas during the 2003-2012 spring trawl surveys.

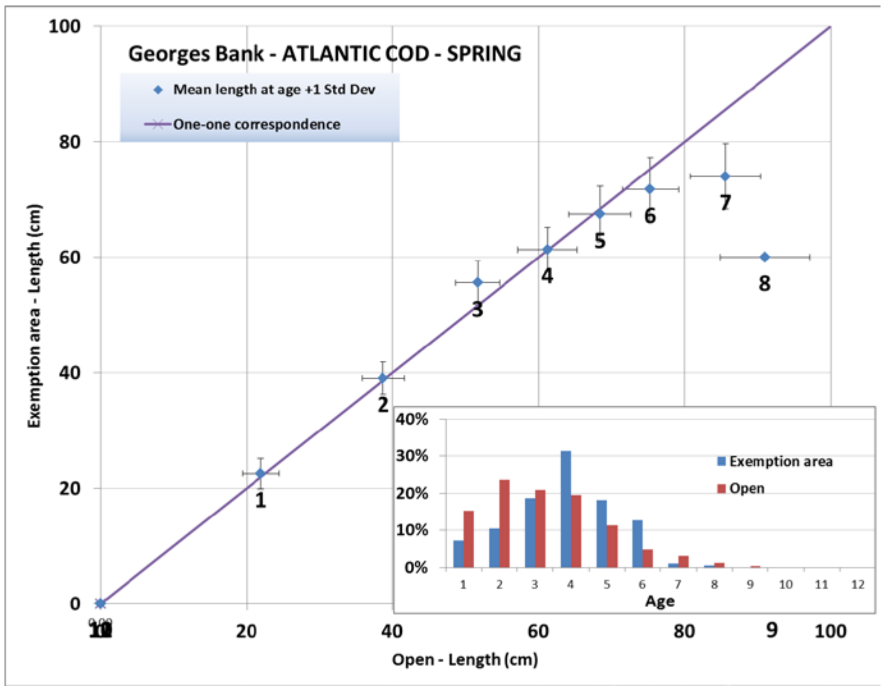
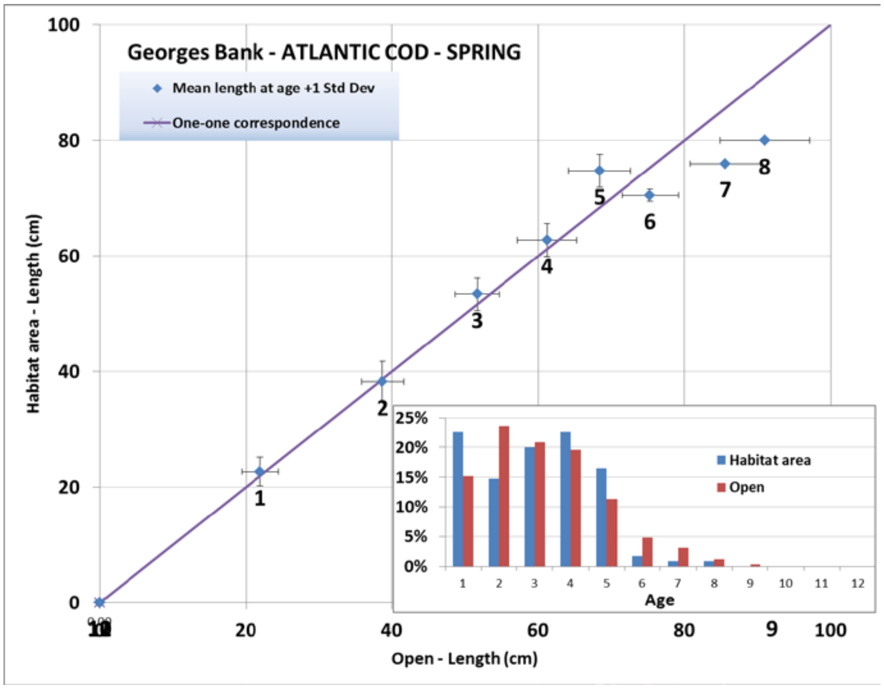


Figure 61 - Comparison of Georges Bank female cod lengths at age between proposed those caught in the existing habitat areas and those caught in currently open fishing areas during the 2003-2012 spring trawl surveys.



During the spring survey, most of the sampled female cod on Georges Bank and particlarly in the Cod HAPC and Closed Area II were in resting condition (Figure 62). Further, there appear to be few if any differences in maturity stage at age (Figure 63). Of course, this observation from the spring survey data does not mean that Georges Bank cod don't spawn in and around Closed Area I, but rather that the spring survey misses the peak spawning activity there. Cod sampled for maturity in the spring survey around Closed Area I were mainly classified as immature, but occurred mainly in the nearby open fishing areas and to some extent in the existing habitat closure. The largest female code ages 5+ were scattered about Georges Bank, with no apparent concentration of fish (Figure 64).

Figure 62 - Geographical distribution of female cod maturity stages during the 2003-2012 spring trawl surveys.

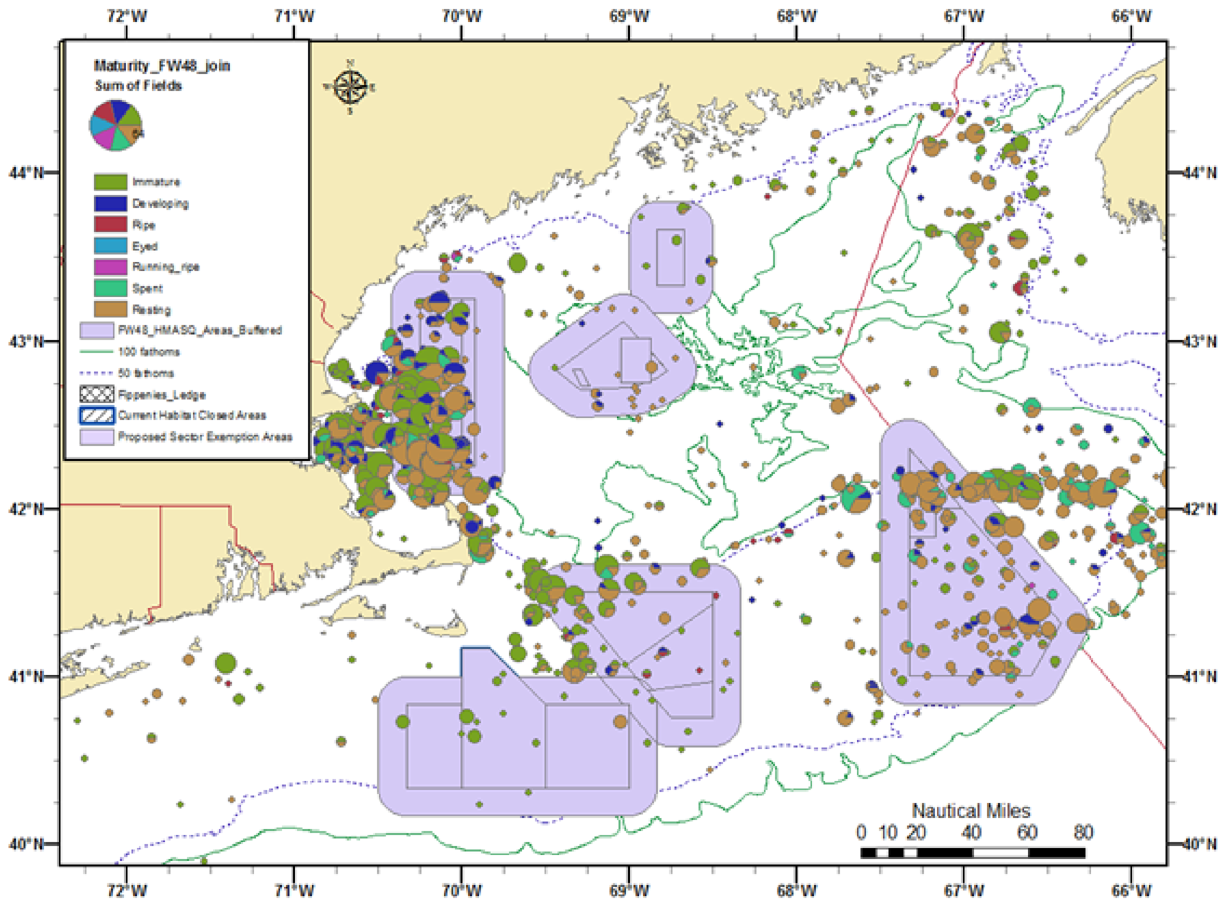


Figure 63 - Proportion mature at age by type of management area for female Georges Bank cod sampled during the 2002-2012 spring surveys.

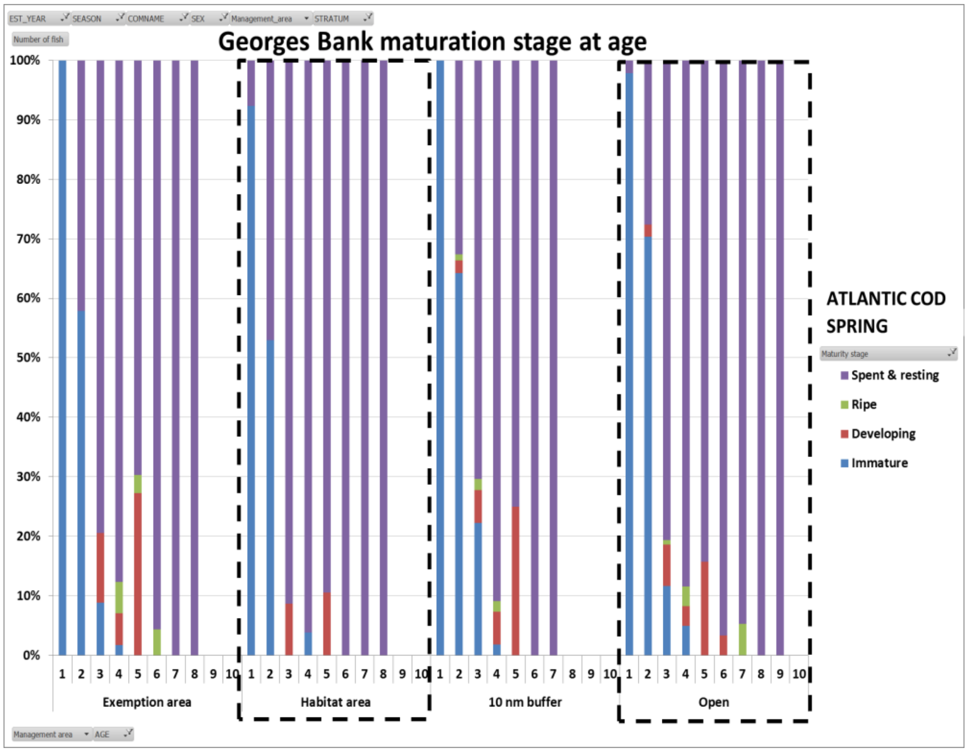
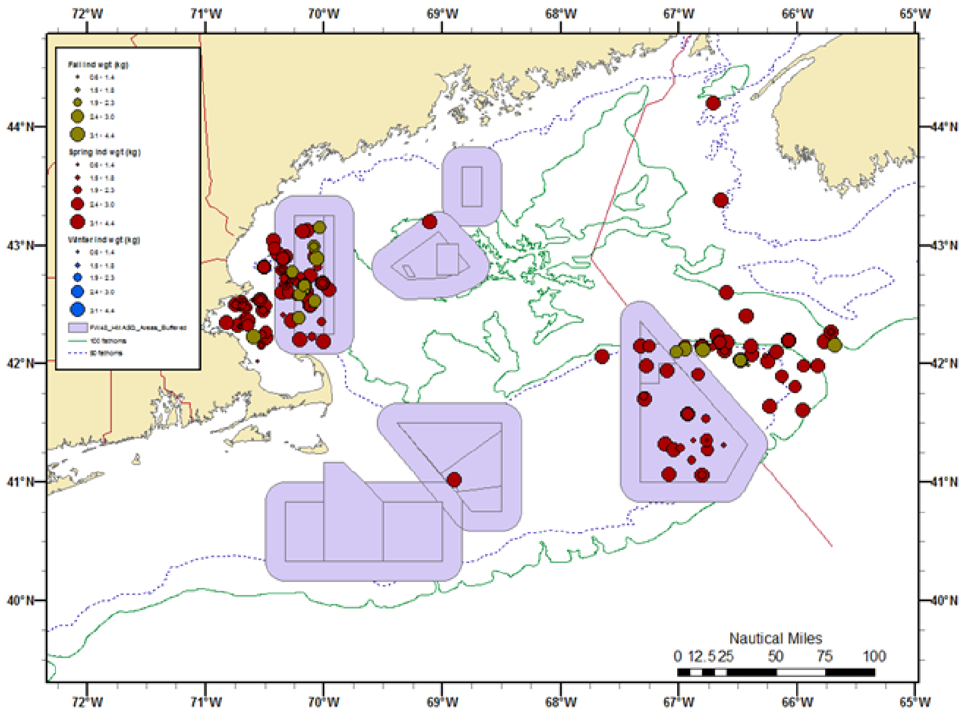


Figure 64 - Geographical distribution of 5+ female cod during the 2003-2012 spring, 2002-2011 fall and 2002-2007 winter trawl surveys.



In the Gulf of Maine, differences in length at age amoung types of management areas do appear to occur. Age 4-6 cod in the proposed exemption areas appear to be larger than those in currently open fishing areas (Figure 65). Aged cod for other ages in the proposed exemption areas were not sampled during the 2002-2012 spring surveys. Except for ages 5-7, lengths at age for cod from the existing habitat areas (Figure 66) were nearly identical to those sampled from currently open fishing areas. Age 5-7 cod were however larger in the habitat areas than in open fishing areas. Differences in length at age between types of management areas in the Gulf of Maine were less apparent in fall survey data.

Figure 65 - Comparison of Gulf of Maine female cod lengths at age between proposed those caught in the proposed sector exemption areas and those caught in currently open fishing areas during the 2003-2012 spring trawl surveys.

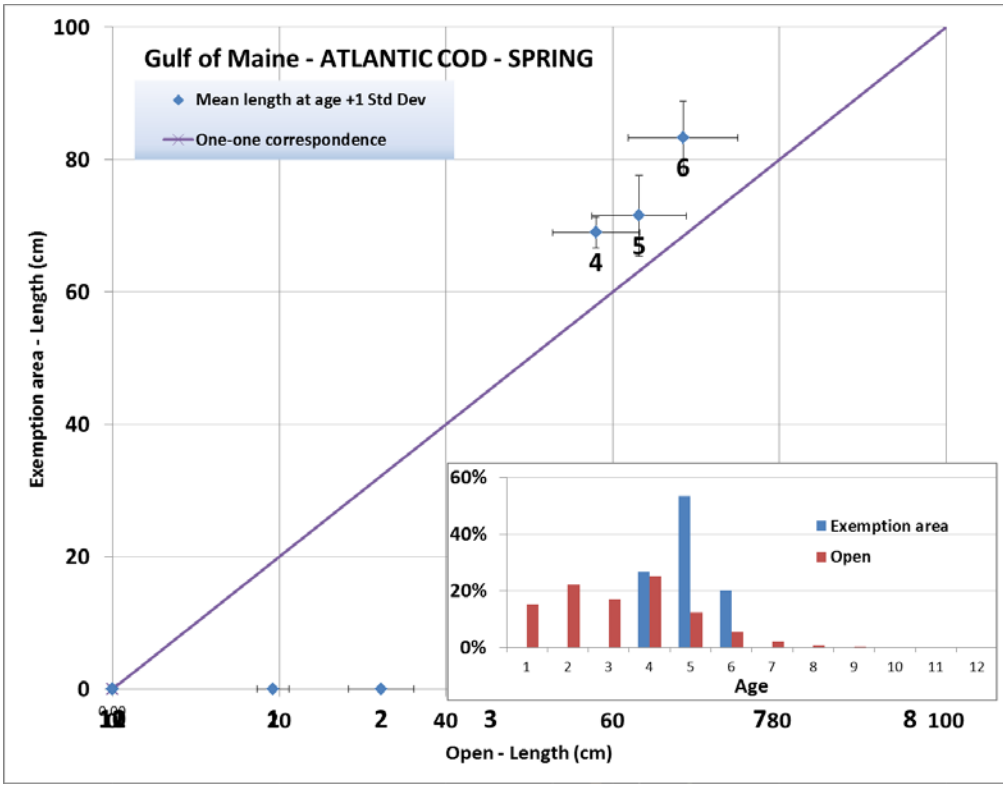
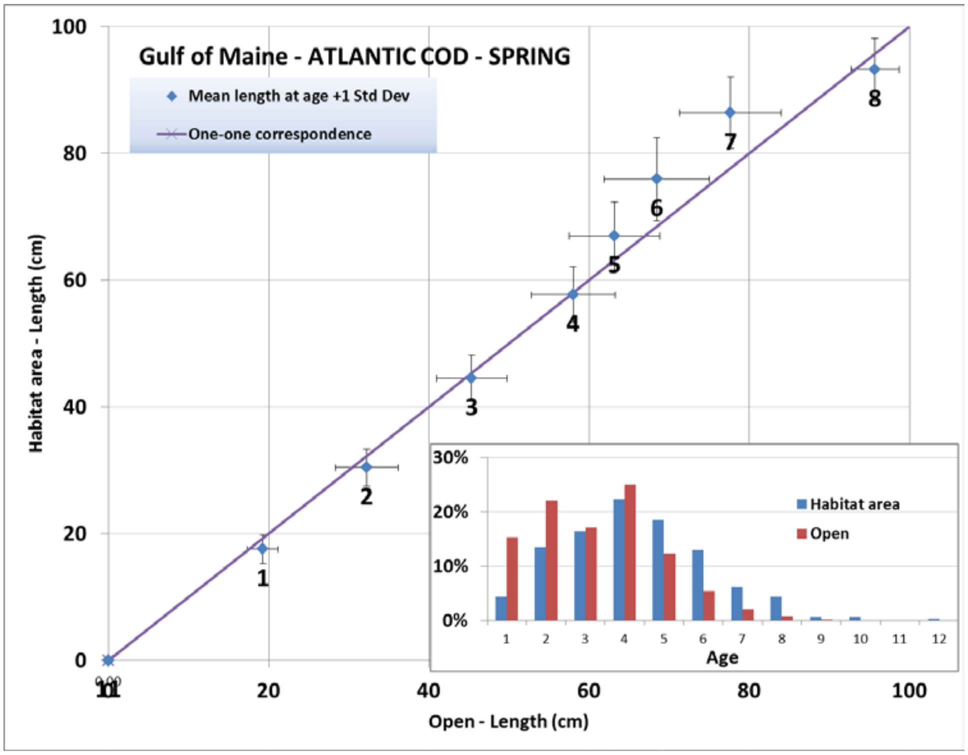


Figure 66 - Comparison of Gulf of Maine female cod lengths at age between proposed those caught in the existing habitat areas and those caught in currently open fishing areas during the 2003-2012 spring trawl surveys.



More developing cod were observed in the Gulf of Maine during the spring survey than on Georges Bank due primarily to differences in spawning timing. There are relatively few apparent differences between the maturation at age of cod in the different types of management areas (Figure 67), however, except that fewer old female cod (and thus fewer developing female cod) were sampled from the proposed Cashes Ledge and particularly the Western Gulf of Maine exemption areas (Figure 64). Most of the resting or developing (i.e. not immature) cod in the Gulf of Maine were sampled from tows in the SW part of the existing habitat area of the Western Gulf of Maine closed area, and in open fishing areas to its west. This result is more apparent in the distribution of old (5+) female cod in the spring and fall. In the fall (Figure 68), many deveping cod were observed in the Great South Channel, on Stellwagen Bank, and in Massachuesetts and Ipswich Bays. Some northerly migration is expected as the female fish ripen, but the winter trawl survey did not sample these areas. During the fall survey, higher concentrations of small (and thus immature) cod were observed from the Great South Channel through Stellwagen Bank, and Massachusetts Bay.

Figure 67 - Proportion mature at age by type of management area for female Gulf of Maine cod sampled during the 2002-2012 spring surveys.

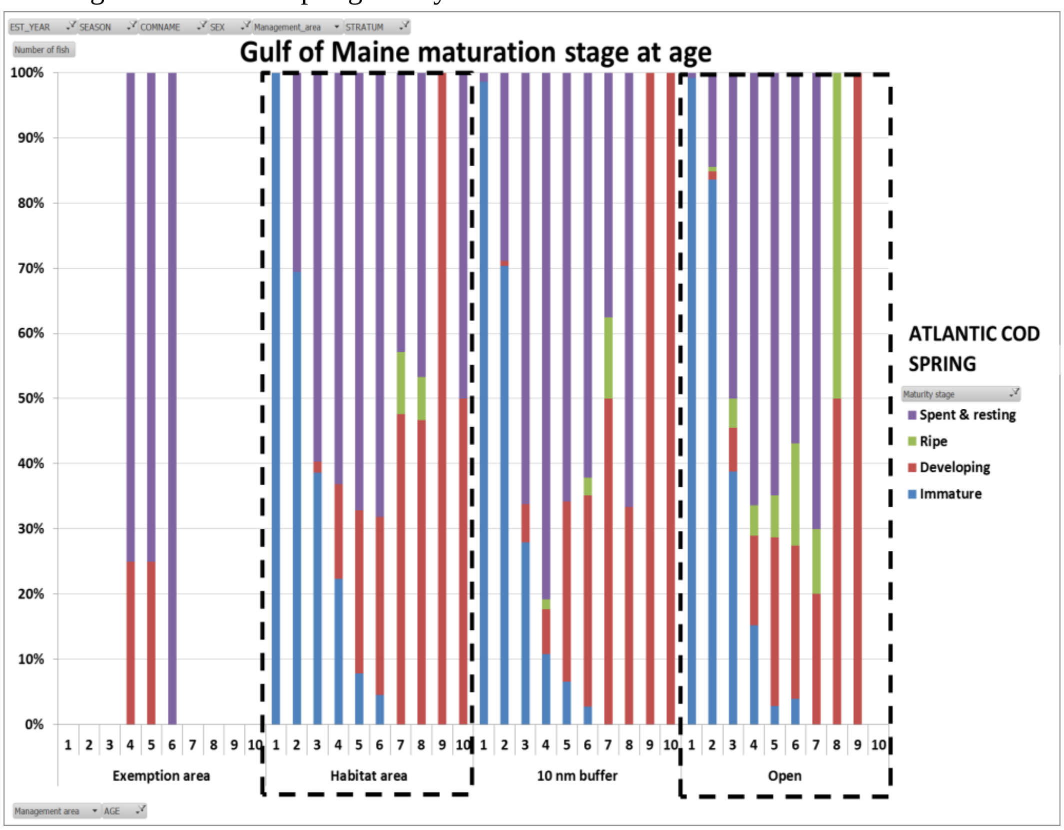
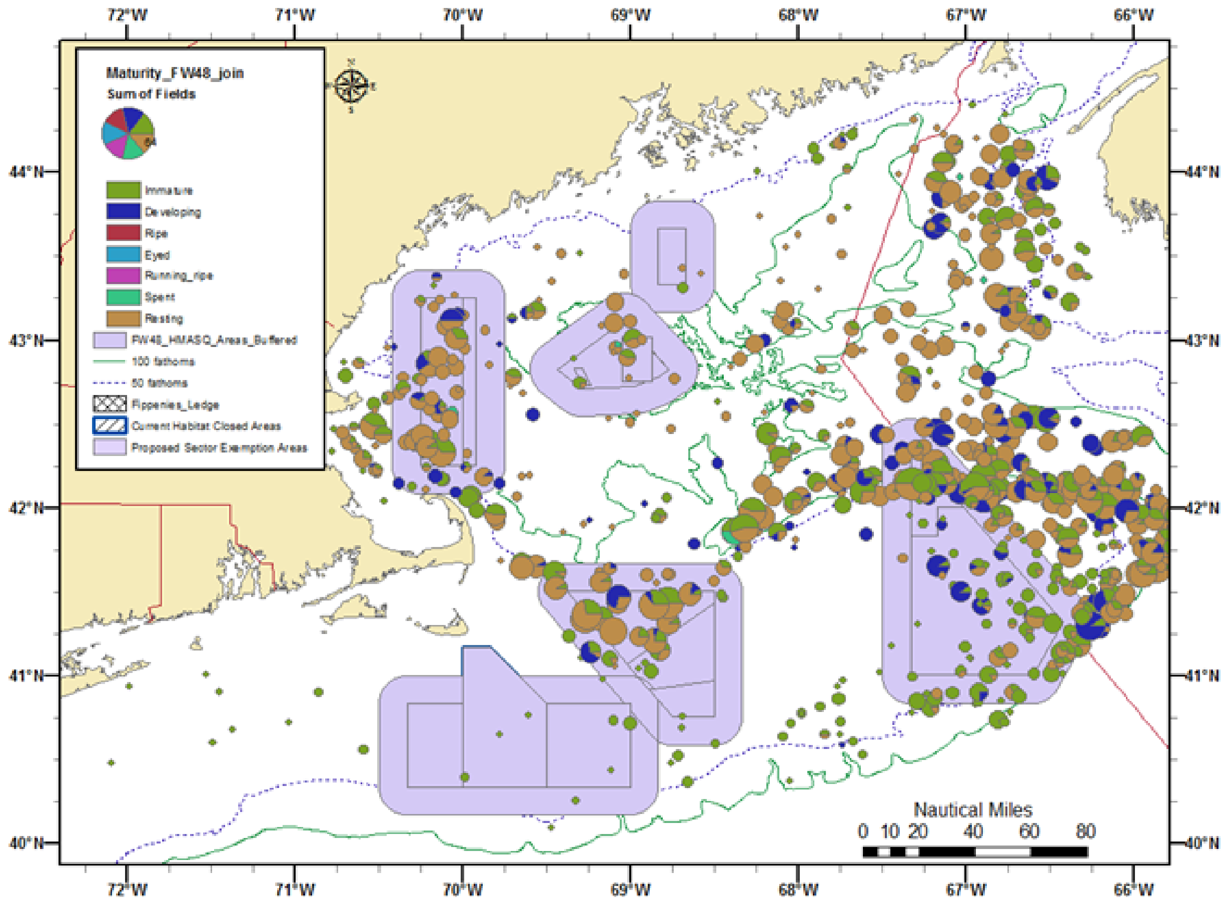
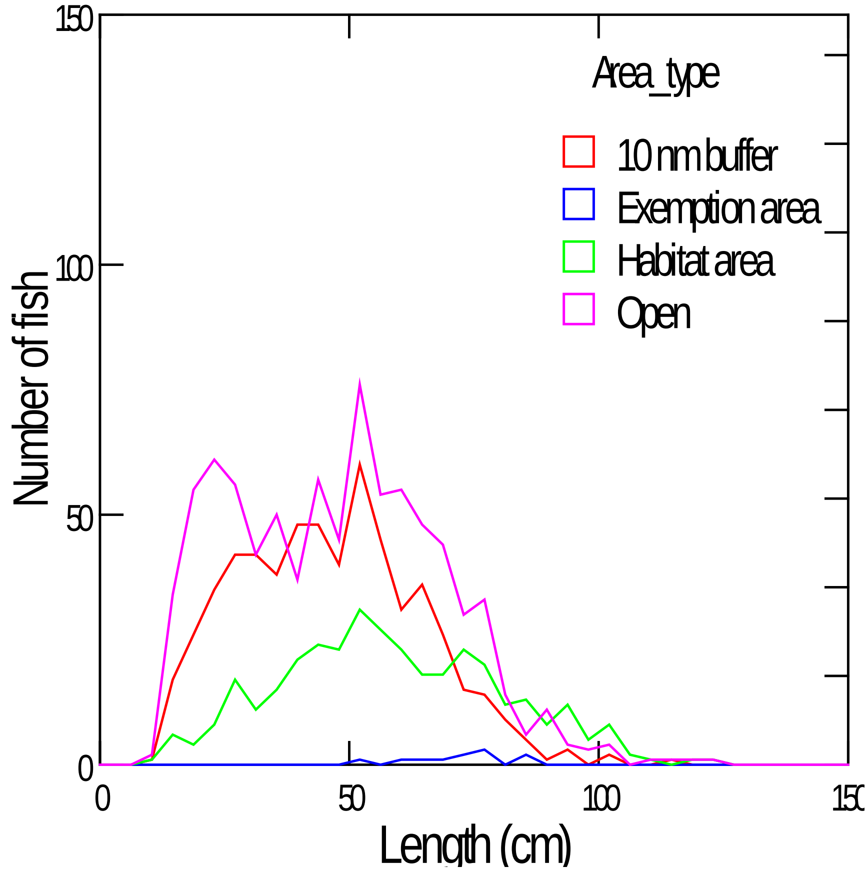


Figure 68 - Geographical distribution of female haddock maturity stages during the 2002-2011 fall trawl surveys.



It was more difficult to make similar comparisons of biological data for individually for the Western Gulf of Maine and Cashes Ledge areas (see Table 15 in Appendix I). Few cod were sampled for biological characteristics in the proposed Cashes Ledge sector exemption and the length-frequency distribution (Figure 69), the length at age, and the maturation stage proportions at age for the Western Gulf of Maine area mimiced the distribution for the Gulf of Maine stock area.

Figure 69 - Comparative length frequencies of female Georges Bank cod during 2002-2012 spring surveys. The exemption and habitat areas only include ones that overlap the Western Gulf of Maine closed area.



6.6.1.3.7 Yellowtail flounder

The spring and fall surveys catch yellowtail flounder in Southern New England, the southern and eastern portion of Georges Bank, and the shallower portions of the Gulf of Maine, including Massachusetts and Ipswich Bays. In the spring, most of the developing female yellowtail flounder are in the Closed Area II exemption area and in Canada (Figure 70), with some additional fish in the open fishing areas near the SW part of Georges Bank. Nearly 80% of age 3 fish are developing with few observable differences in maturation among types of management areas. Differences for weight-length relationships (Figure 71) and length at age (Figure 72) were not observed for either yellowtail flounder in the proposed exemption areas or in current habitat closed areas. Differences in the relative proportion of yellowtail flounder at length among types of management areas were not observed in either Georges Bank (Figure 73) or the Gulf of Maine (Figure 74).

Figure 70 - Geographical distribution of female yellowtail flounder maturity stages during the 2002-2012 spring trawl surveys.

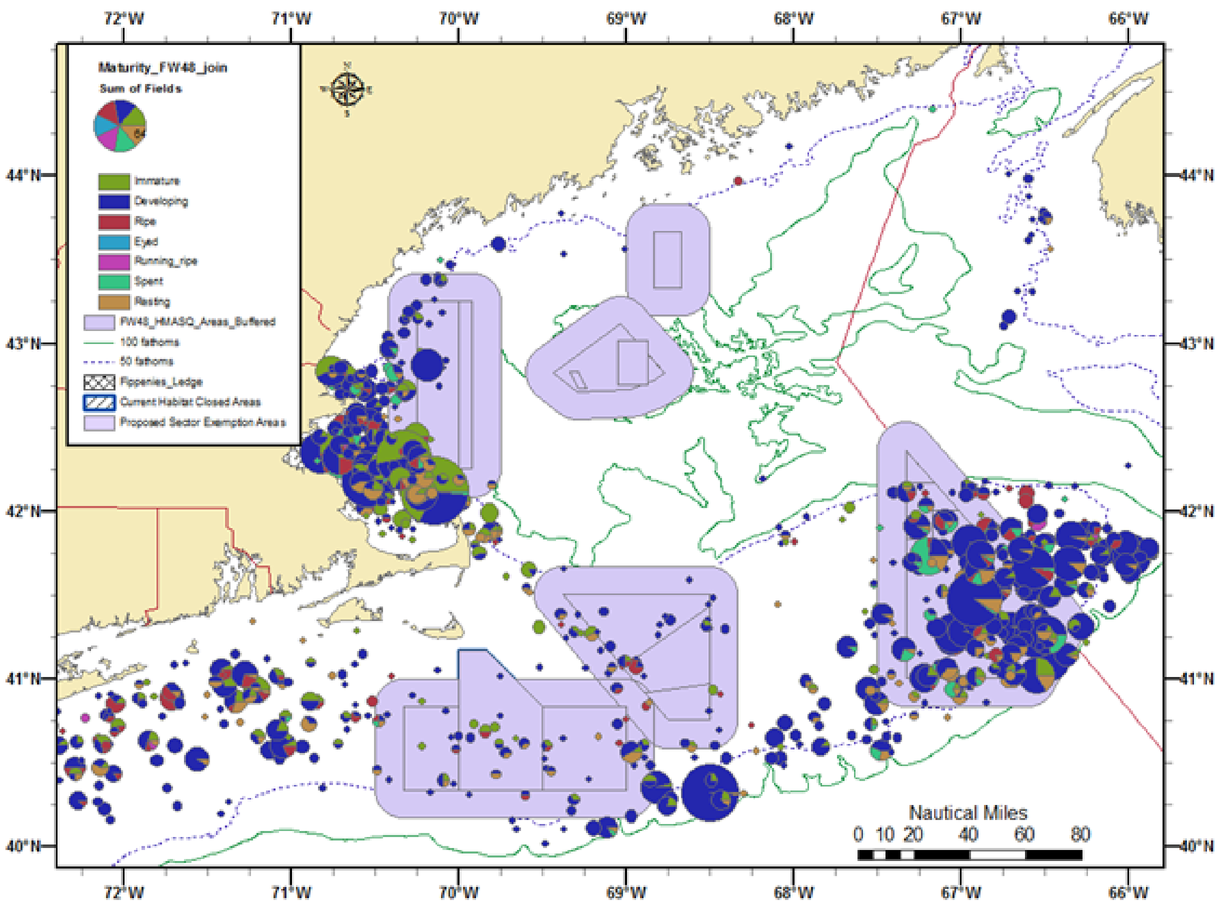


Figure 71 - Length-weight relationships by management area type for Georges Bank female yellowtail flounder during the 2002-2012 spring surveys.

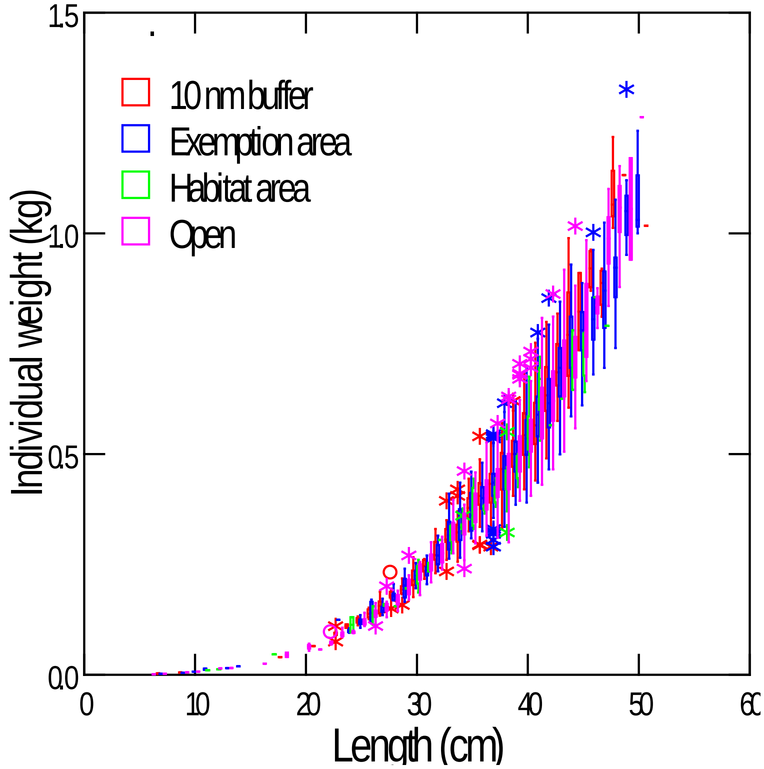


Figure 72 - Comparison of Georges Bank female yellowtail flounder lengths at age between proposed those caught in the existing habitat areas and those caught in currently open fishing areas during the 2002-2012 spring trawl surveys.

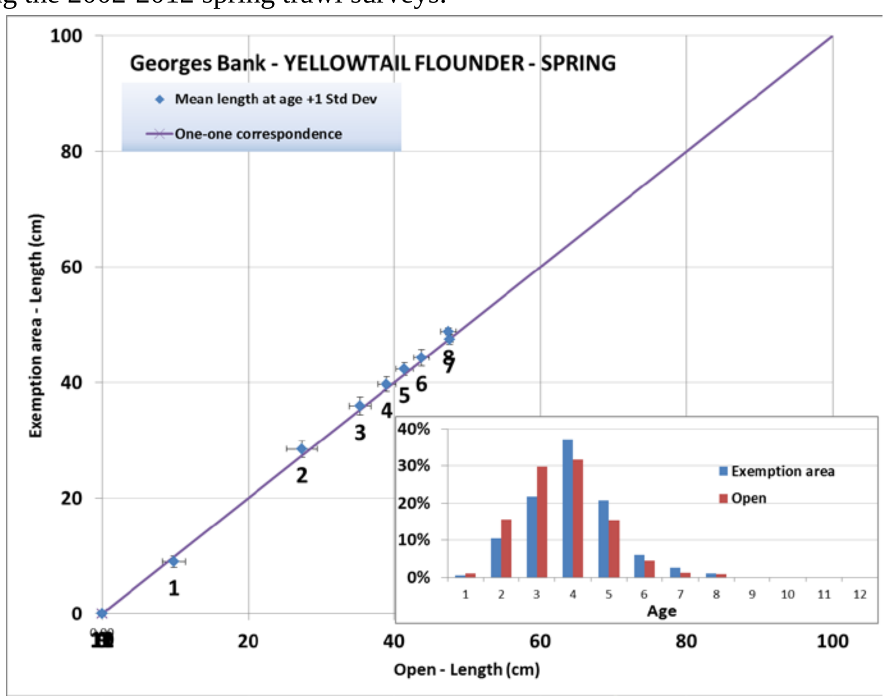


Figure 73 - Comparative length frequencies of female Georges Bank yellowtail flounder during 2002-2012 spring surveys.

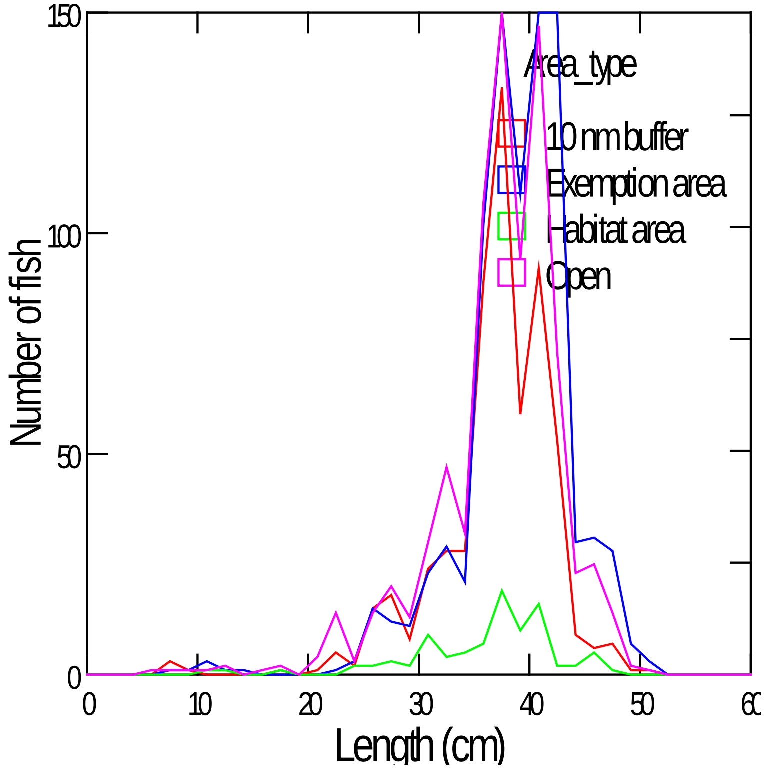
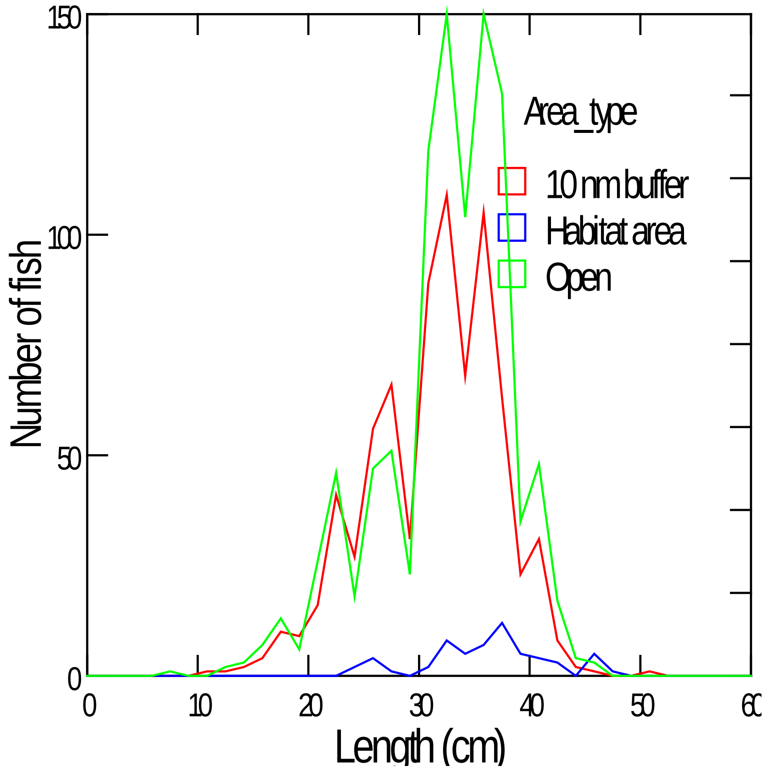
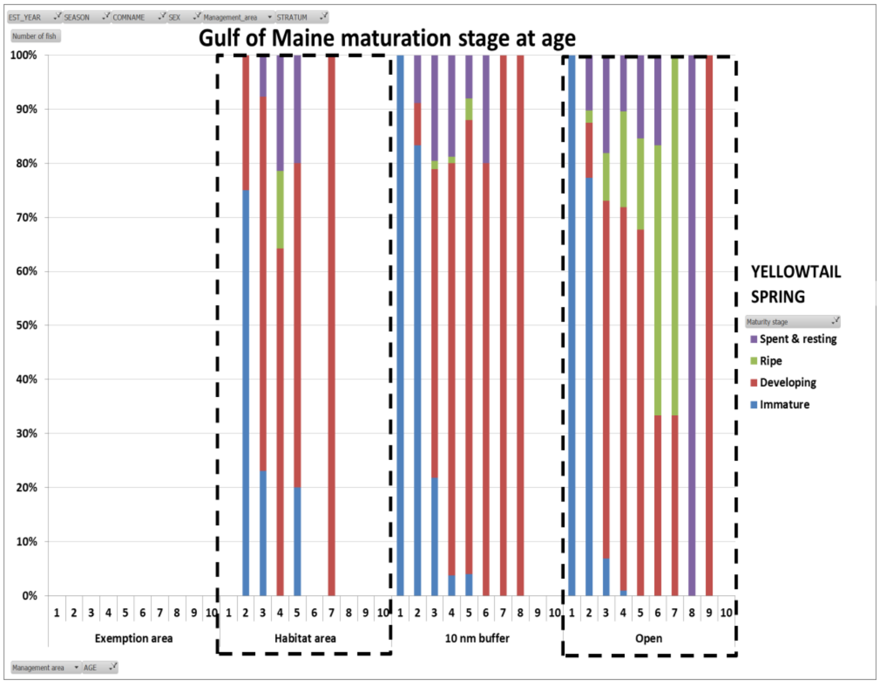


Figure 74 - Comparative length frequencies of female Gulf of Maine yellowtail flounder during 2002-2012 spring surveys.



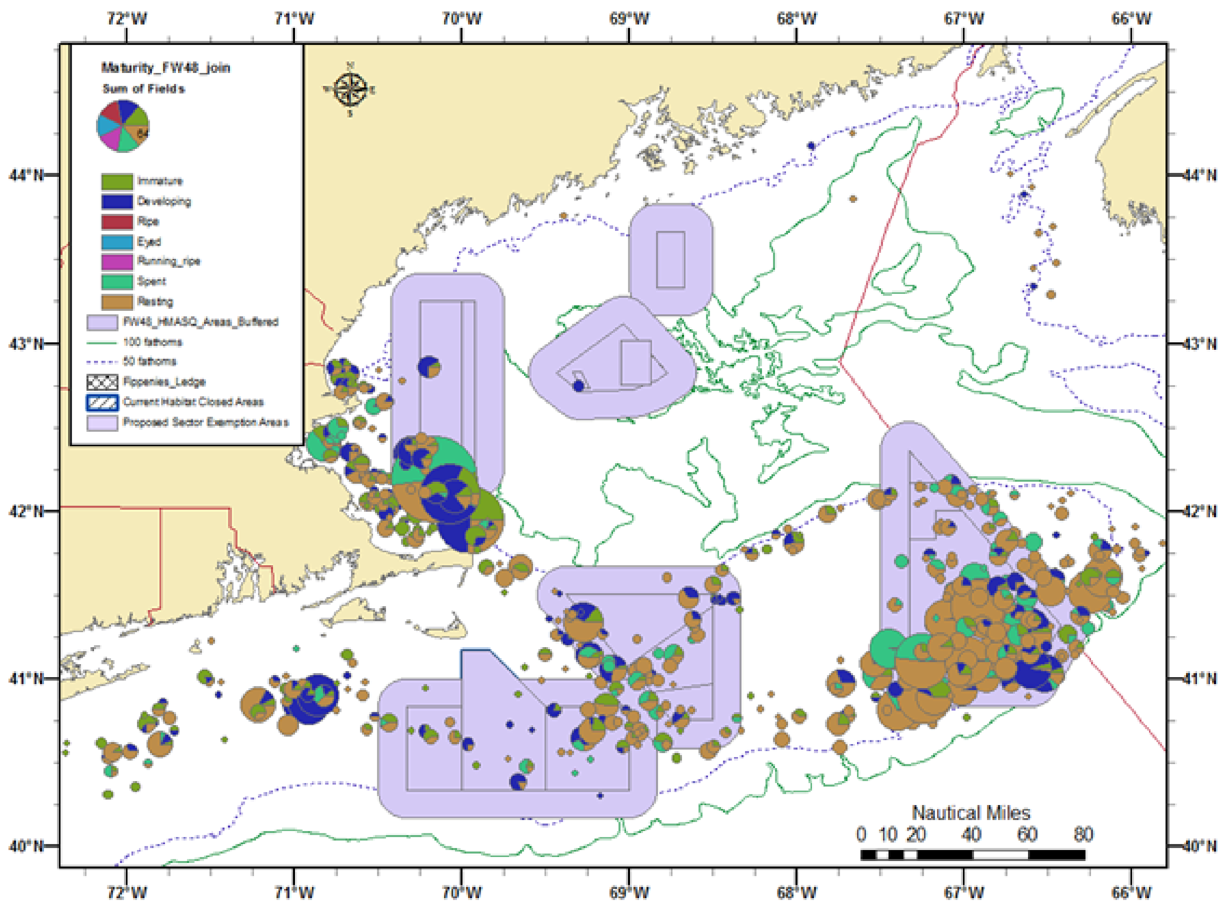
In the Gulf of Maine, most of the yellowtail flounder were developing, but more of the flunder were in ripe spawning condition in the open fishing areas (Figure 75). This diffierence is probably caused more by a timing issue than due to a spawning aggregation.

Figure 75 - Proportion mature at age by type of management area for female Gulf of Maine yellowtail flounder sampled during the 2002-2012 spring surveys.



In the fall survey, most of the yellowtail flounder are caught in southern Georges Bank, overlapping the sector exemption area of Closed Area II, in the Great South Channel, overlapping the secotre exemption areas of the Nantucket Lightship Area and Closed Area I, and in Massachusetts and Ipswich Bays (Figure 76). In contrast to the yellowtail flounder from the spring survey, most of the fish were in resting condition, with notable concentrations of immature and developing yellowtail flounder in the southern part of Massachuesetts Bay, very few yellowtail flounder in the Western Gulf of Maine closed area.

Figure 76 - Geographical distribution of female yellowtail flounder maturity stages during the 2002-2011 fall trawl surveys.



6.6.1.3.8 Winter flounder

Winter flounder were one of two species (the other being haddock) that were determined by statistical analysis to benefit from year round closed areas on Georges Bank (Kerr et al., 2012). This conclusion is supported in the biological data collected during the spring and fall trawl surveys. Higher proportions of large winter flounder were observed in the Georges Bank proposed sector exemption areas and the current habitat closed areas, during both the spring (Figure 77) and fall (Figure 78) surveys. And although few winter flounder were caught by the survey in the Western Gulf of Maine and Cashes Ledge areas, winter flounder in the 10nm buffer around the Western Gulf of Maine area tend to be larger than those in the open fishing areas of the Gulf of Maine (Figure 79).

Figure 77 - Comparative length frequencies of female Georges Bank winter flounder during 2002-2012 spring surveys

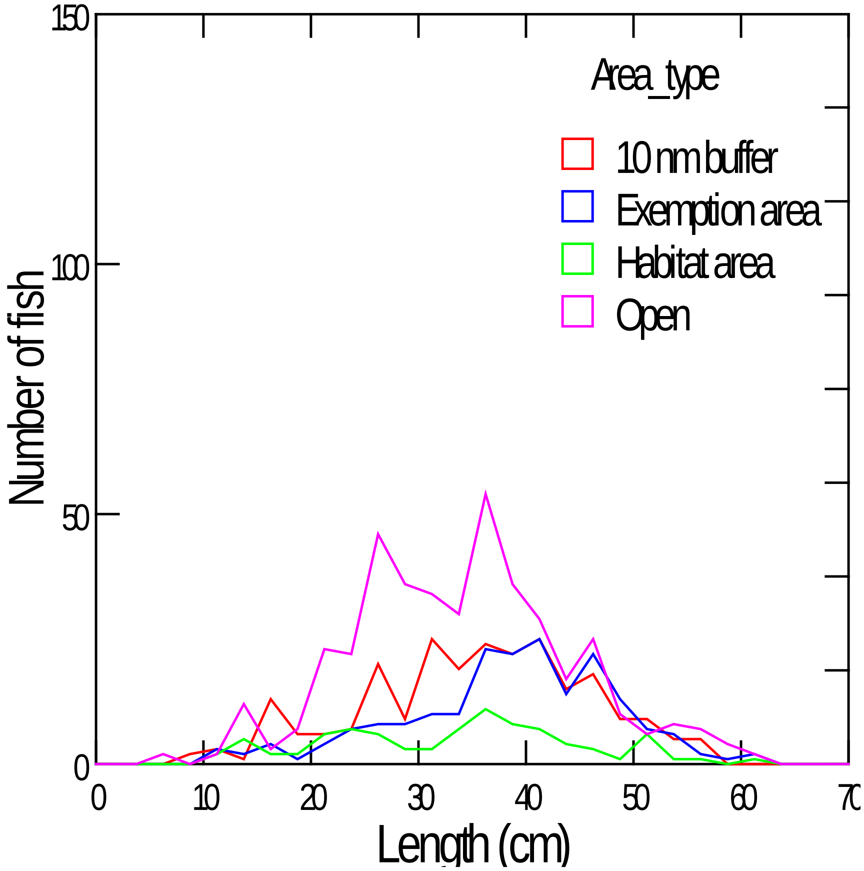


Figure 78 - Comparative length frequencies of female Georges Bank winter flounder during 2002-2011 fall surveys

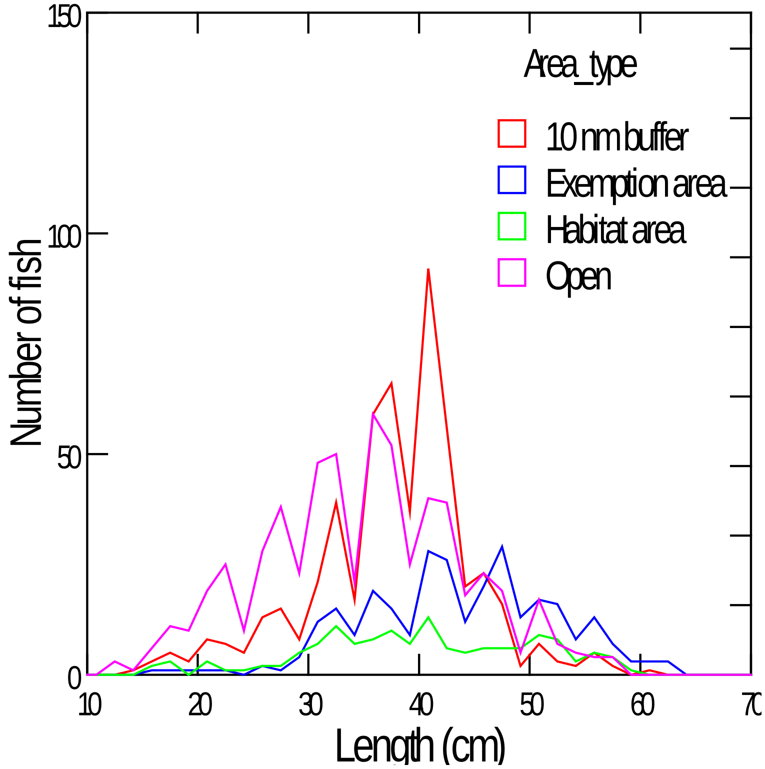
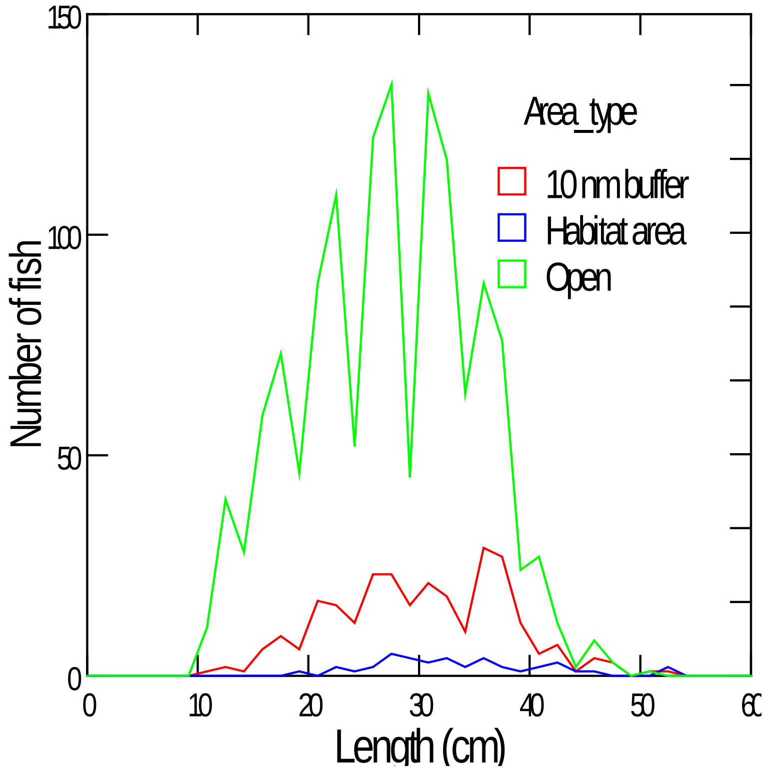


Figure 79 - Comparative length frequencies of female Gulf of Maine winter flounder during 2002-2012 spring surveys



During the spring survey, most of the observed winter flounder were either immature or resting, with most fish occuring in the northern part of Georges Bank, in Massachusetts Bay, in and near the Nantucket Lightship Area, and to a lesser extent in the Great South Channel (Figure 80). More developing winter flounder were observed in the fall survey (Figure 81). Compared to the spring, winter flounder had a similar distribution, with comparatively more fish in the Great South Channel and the sectore exemption area of Closed Area I. Many of the observed developing winter flounder in Closed Area II were in the Cod HAPC. Relatively few winter flounder were caught in the Western Gulf of Maine and Cashes Ledge areas.

Figure 80 - Geographical distribution of female winter flounder maturity stages during the 2002-2012 spring trawl surveys.

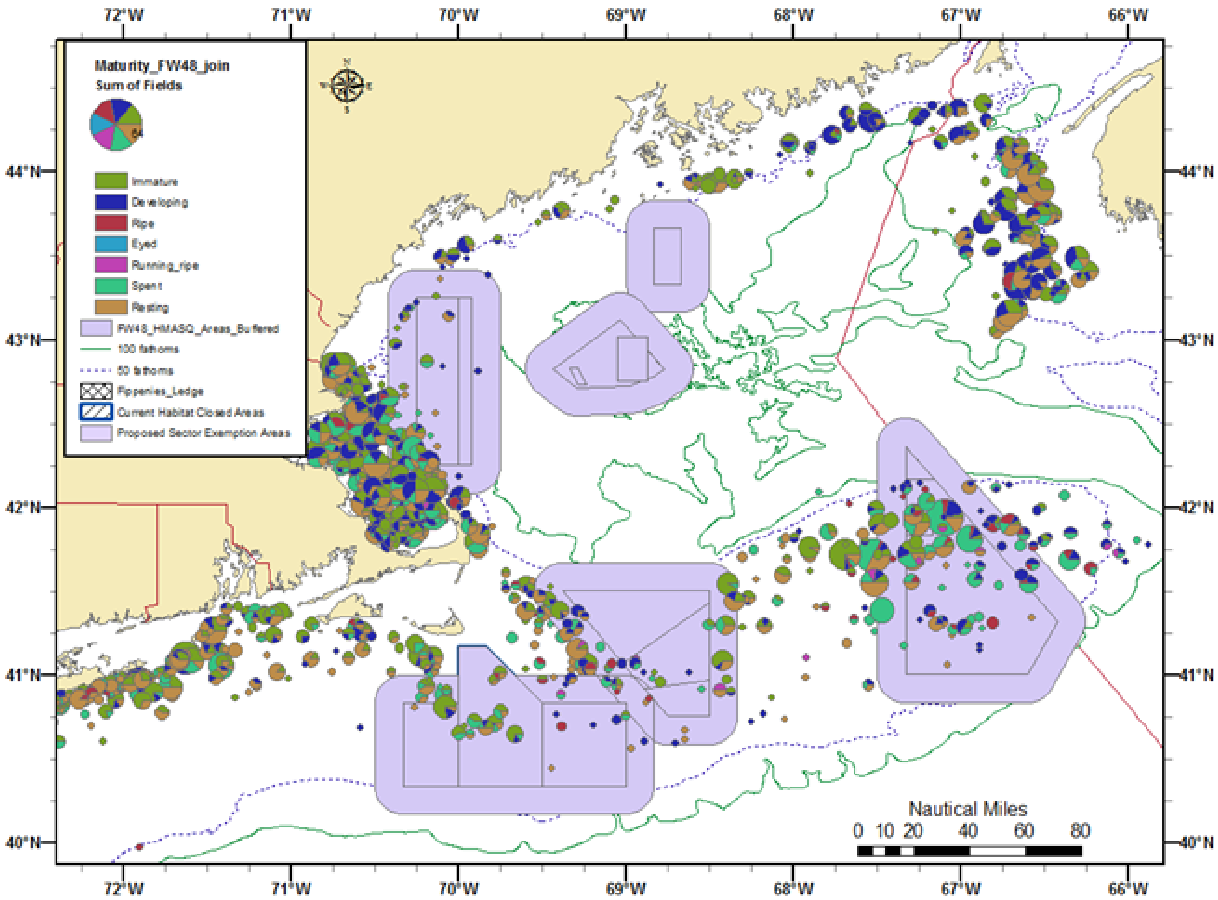
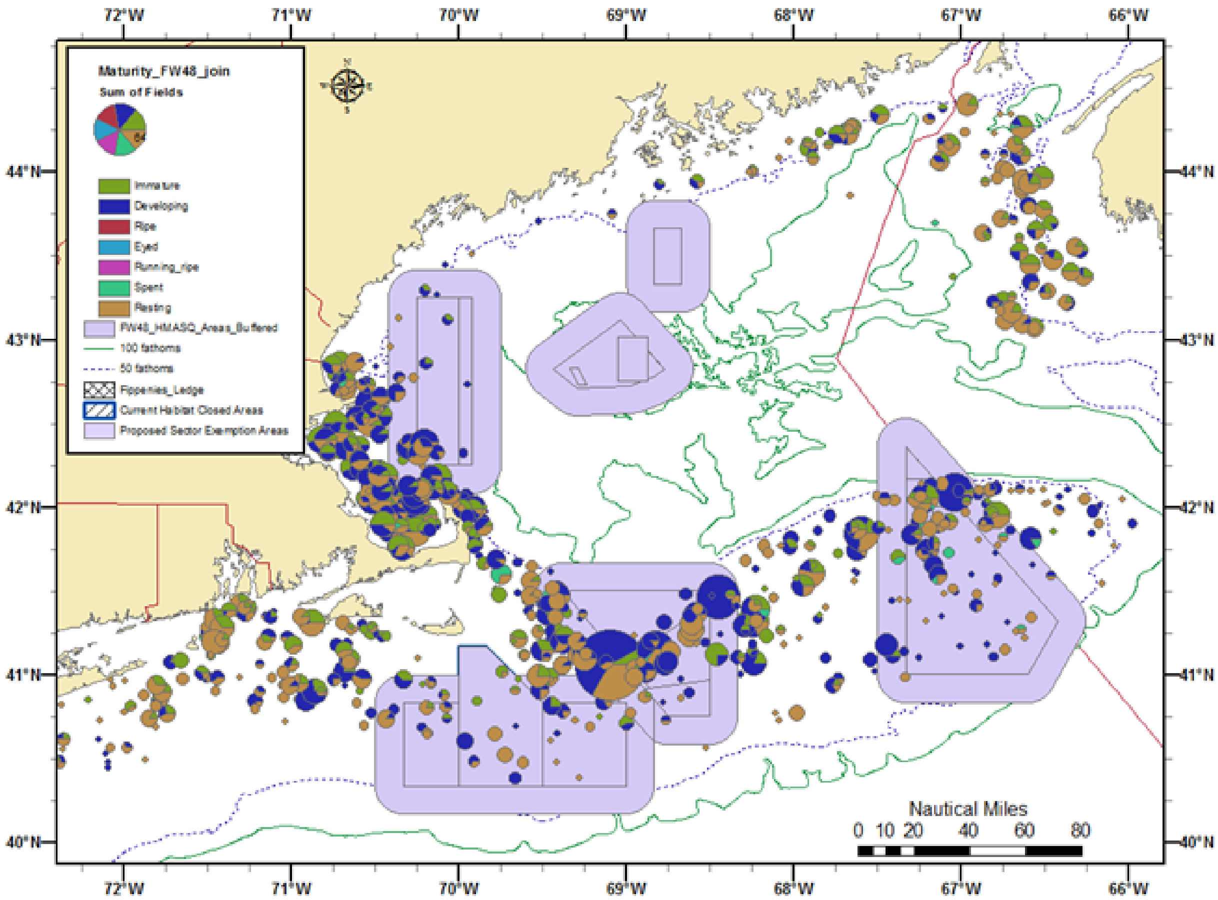


Figure 81 - Geographical distribution of female winter flounder maturity stages during the 2002-2011 fall trawl surveys.



Differences of other biological characteristics among types of management areas were unremarkable, except for the weight-length relationship of winter flounder in the Georges Bank sector exemption areas. Weight at age (Figure 82) and maturity at age (Figure 83) were similar among types of management areas in the spring and fall surveys. Cursory examination of the weight-length relationship for winter flounder caught in the fall survey (Figure 84) indicates that those caught in the proposed sector exemption area may be more robust (heavier at a given length) than those caught elsewhere. Further statistical testing is needed to determine whether this difference is signficant, however.

Figure 82 - Comparison of Georges Bank female winter flounder lengths at age between proposed those caught in the existing habitat areas and those caught in currently open fishing areas during the 2002-2011 fall trawl surveys.

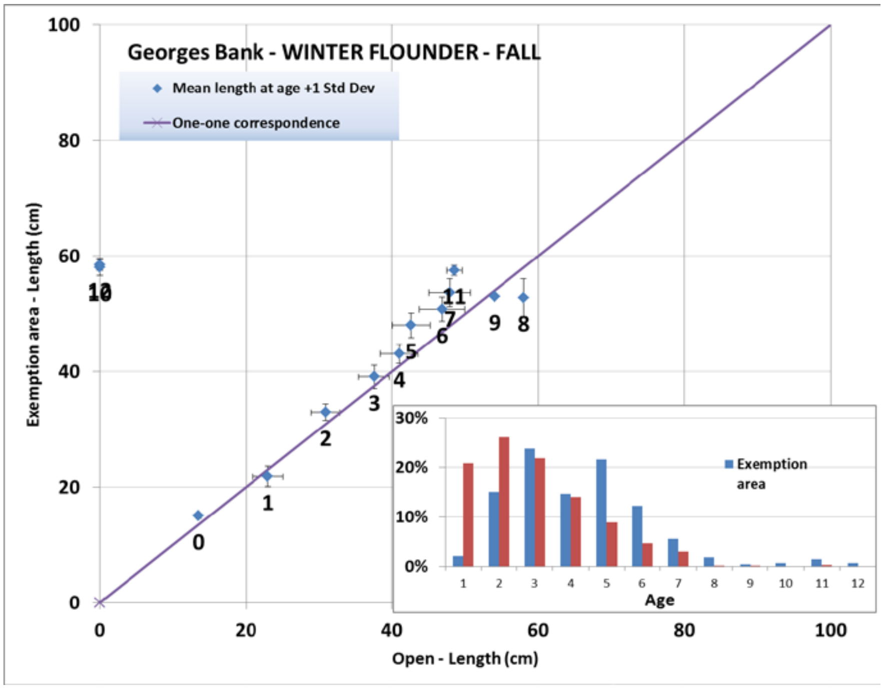


Figure 83 - Proportion mature at age by type of management area for female Gulf of Maine winter flounder sampled during the 2002-2011 fall surveys.

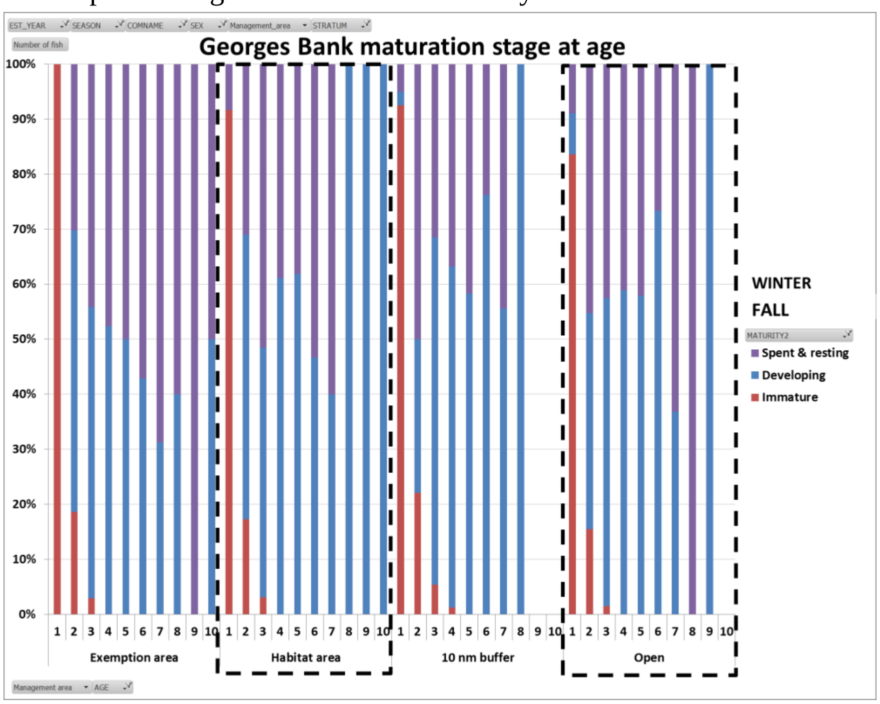
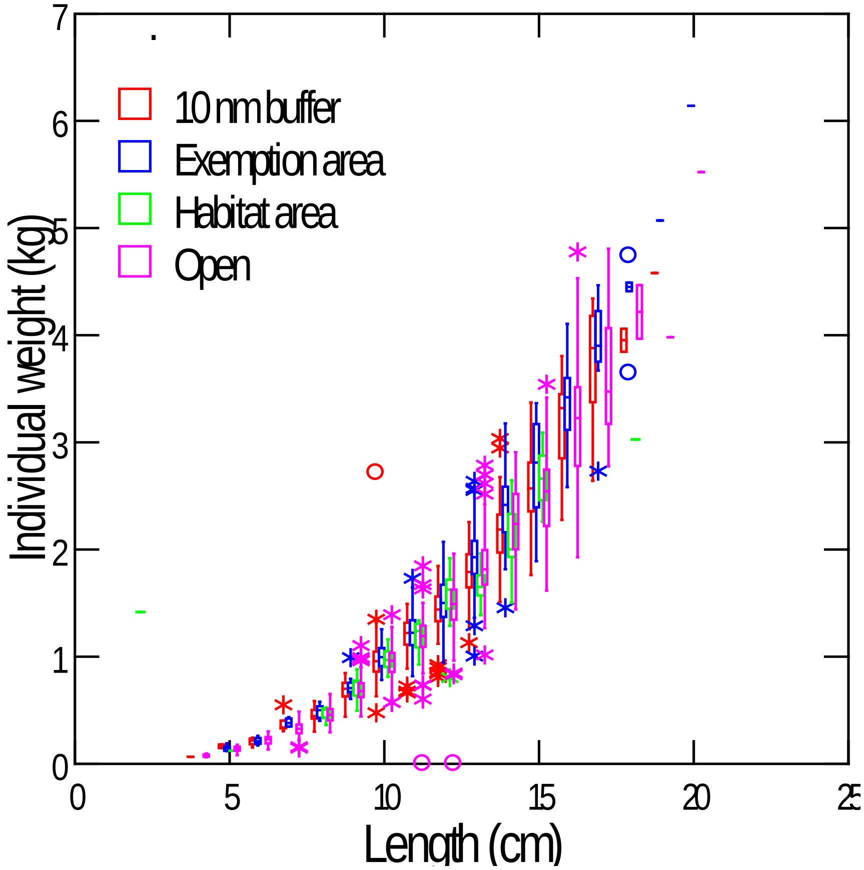


Figure 84 - Length-weight relationships by management area type for Georges Bank female winter flounder during the 2002-2011 fall surveys.



6.6.1.3.9 American lobster

The spring survey caught American lobster around the Gulf of Maine coastline and around the deeper margins of Georges Bank (Figure 85). Relatively few female lobsters were caught in the proposed sector exemption and current habitat areas on Georges Bank. Most female lobsters were not egg-bearing and had no notches, with some egg-bearing fenales caught around the eastern edge of Georges Bank in Canada. Most female lobsters caught in the proposed sector exemption and current habitat areas in the Gulf of Maine were in the Western Gulf of Maine area (Figure 85), and appear to be larger (i.e. > 8 cm) than those caught in open fishing areas of the Gulf of Maine or even in a 10 nm buffer around the closed areas (Figure 86).

Figure 85 - Geographical distribution of female lobster maturity stages during the 2002-2012 spring trawl surveys.

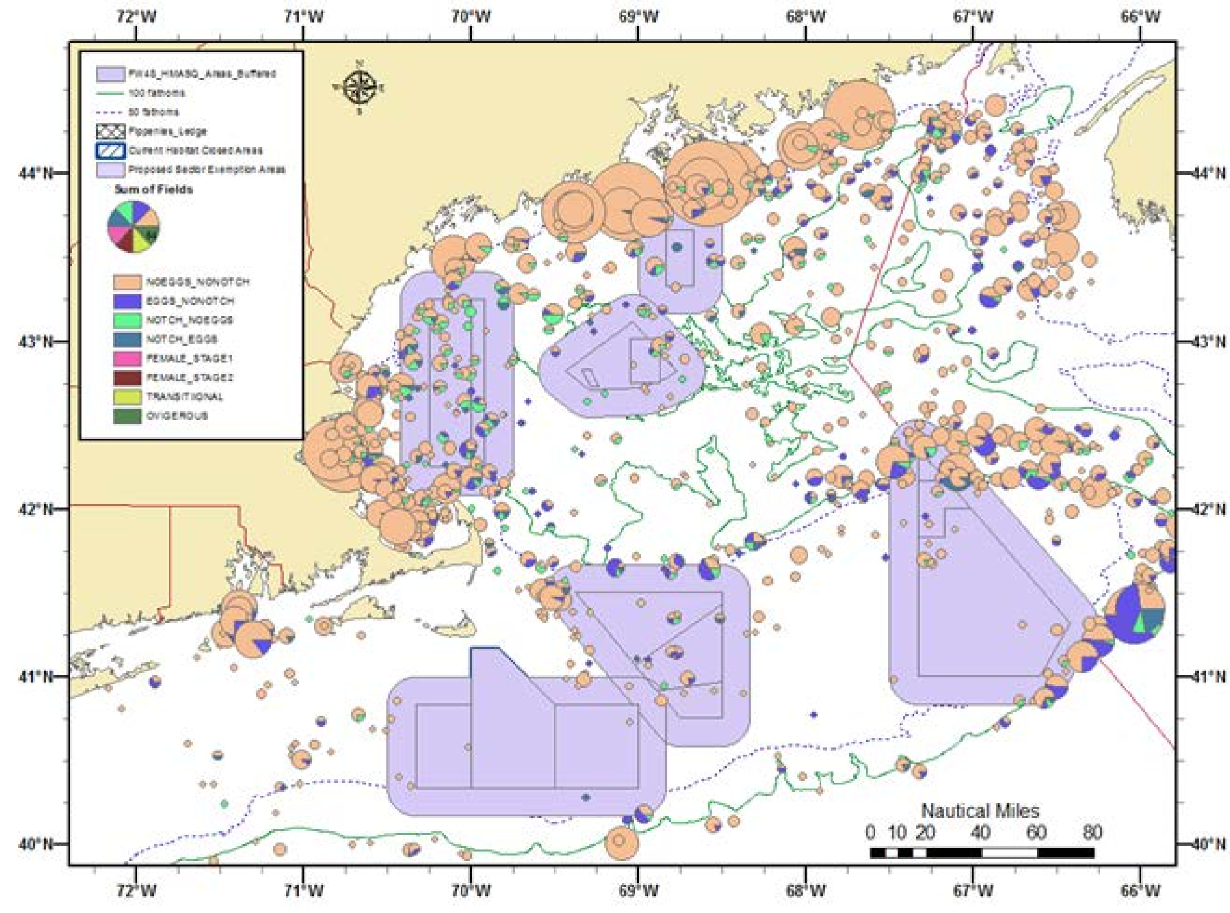
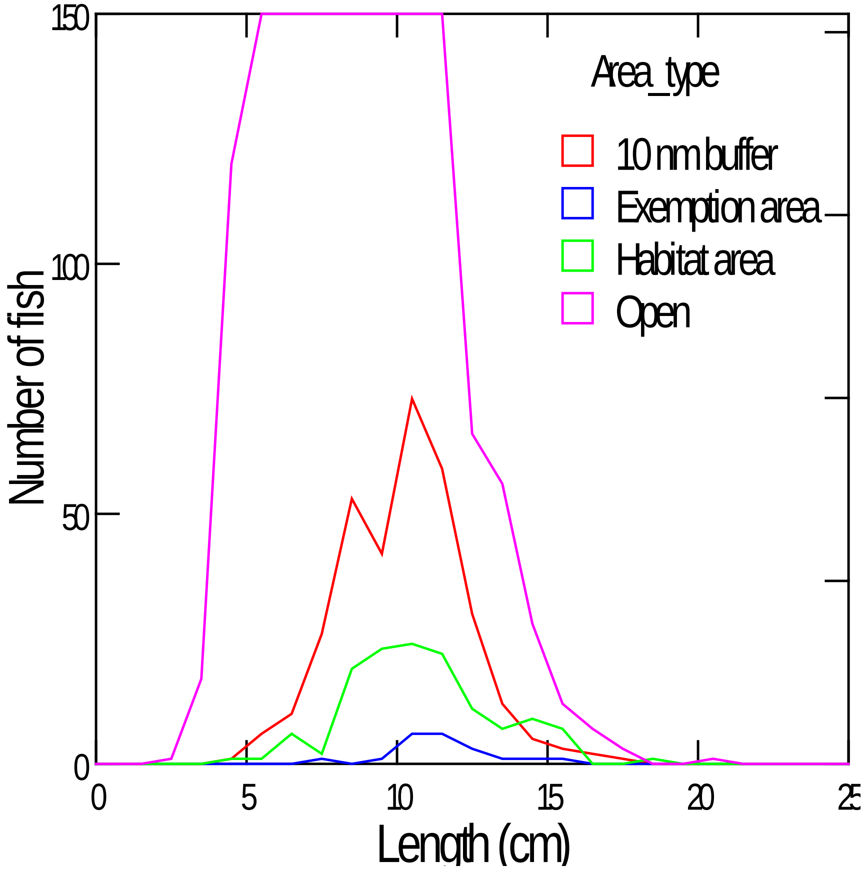
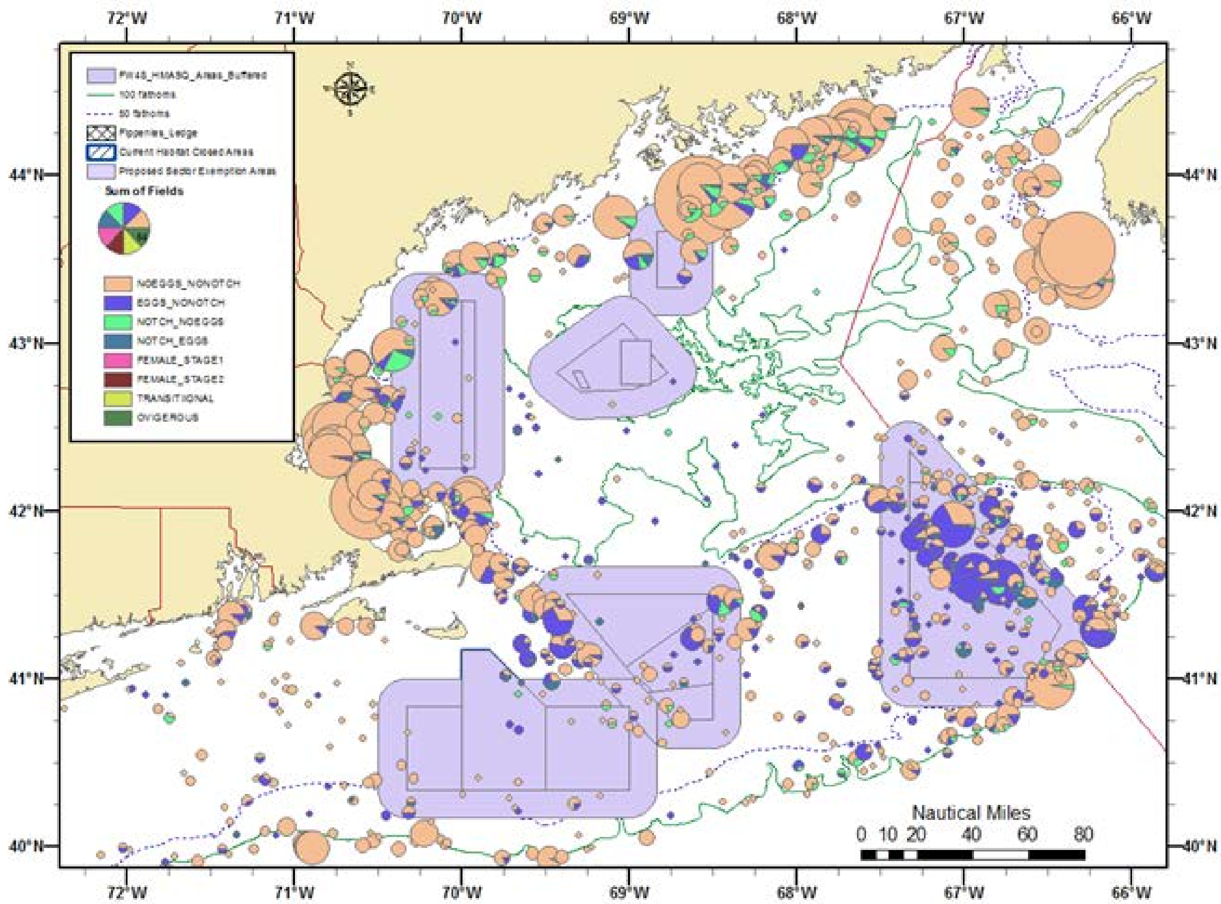


Figure 86 - Comparative length frequencies of female Gulf of Maine lobster during 2002-2012 spring surveys



Female lobsters caught in the spring survey occurred around the coastline of the Gulf of Maine, but few were caught in either the Western Gulf of Maine or Cashes Ledge areas (Figure 87). Relatively more egg-bearing lobsters were caught in the Great South Channel, and in the proposed sector exemption areas of Closed Area I and Closed Area II.

Figure 87 - Geographical distribution of female lobster maturity stages during the 2002-2011 fall trawl surveys.



6.6.1.3.10 Barndoor skate

Although there has been speculation that the Georges Bank closed areas have contributed to the increase in large barndoor skate in the past 10-15 years, more of the larger barndoor skate were observed in open fishing areas, during both the spring (Figure 88) and fall surveys. This observation appears to be related more to depth distribution (Figure 89) than to the type of management area.

Figure 88 - Comparative length frequencies of female Georges Bank barndoor skate during 2002-2012 spring surveys

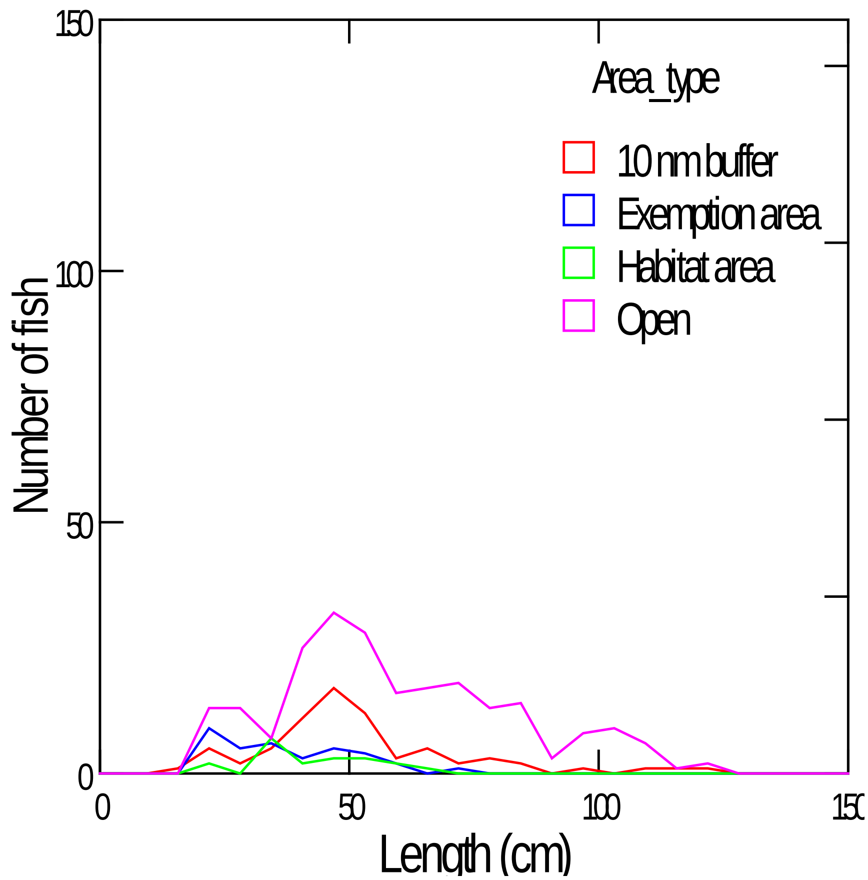
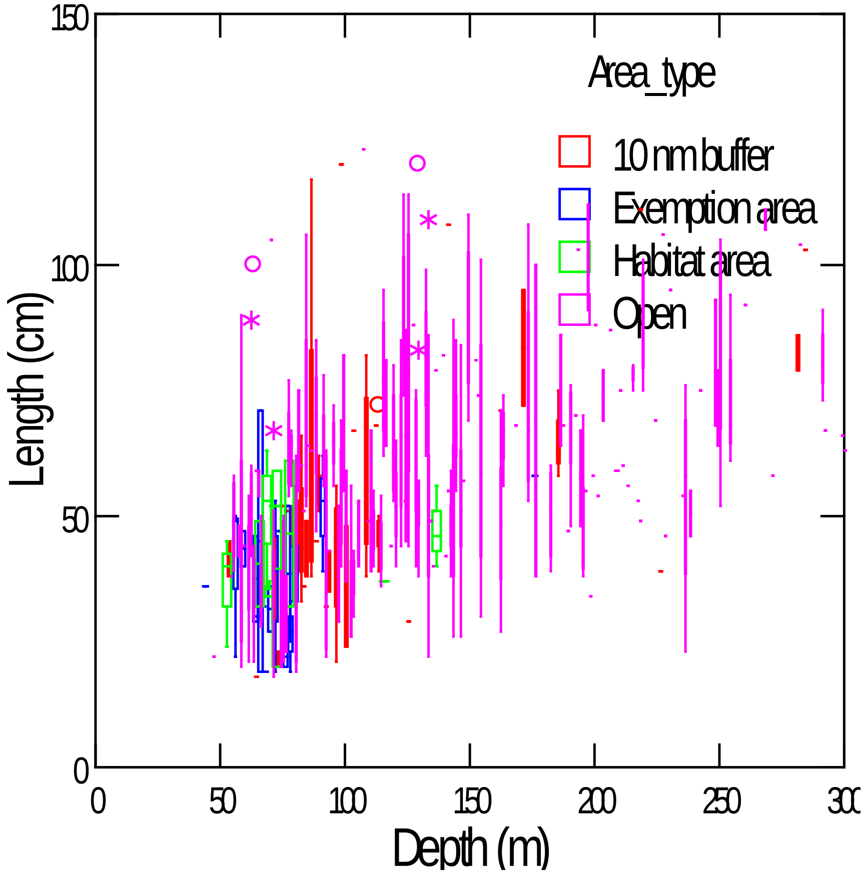


Figure 89 - Box-whisker plot of length vs. depth for barndoor skate caught by the spring trawl survey during 2002-2012.



In the spring survey, barndoor skate catches occurred along the southern margin of Georges Bank and Southern New England (Figure 90). Some additional barndoor skate catches were made north of Closed Area II, in Canada. Smaller barndoor skate appear to occur in the shallower depths found within the Nantucket Lightship Area and Closed Area II proposed sector exemption areas. In the fall, barndoor skate appear to be more widely distributed and in shallower waters of Georges Bank and Southern New England (Figure 91). The smaller barndoor skate occurred in the shallower depths found within the Closed Area I and Closed Area II proposed sector exemption areas.

Figure 90 - Geographical distribution of barndoor skate length frequency during 2002-2012 spring surveys.

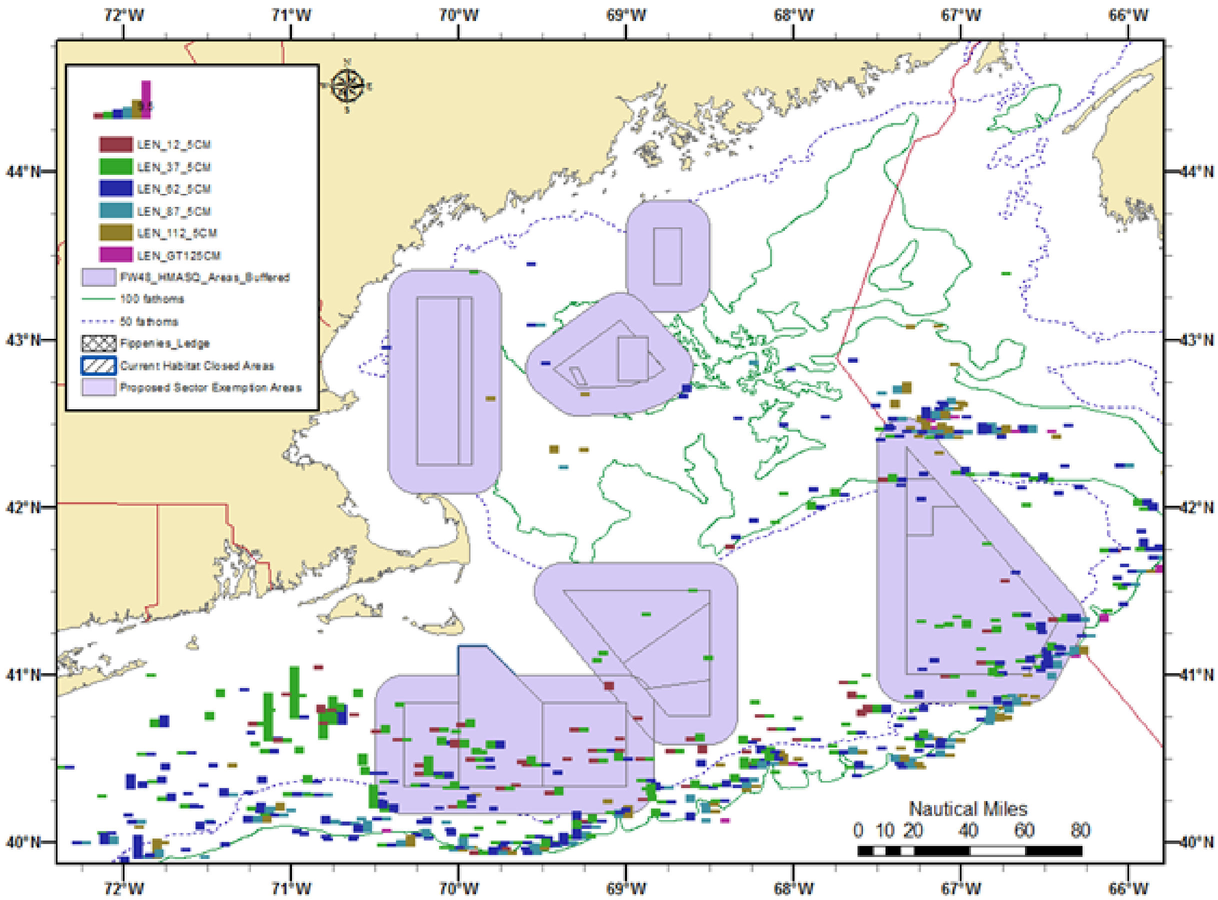
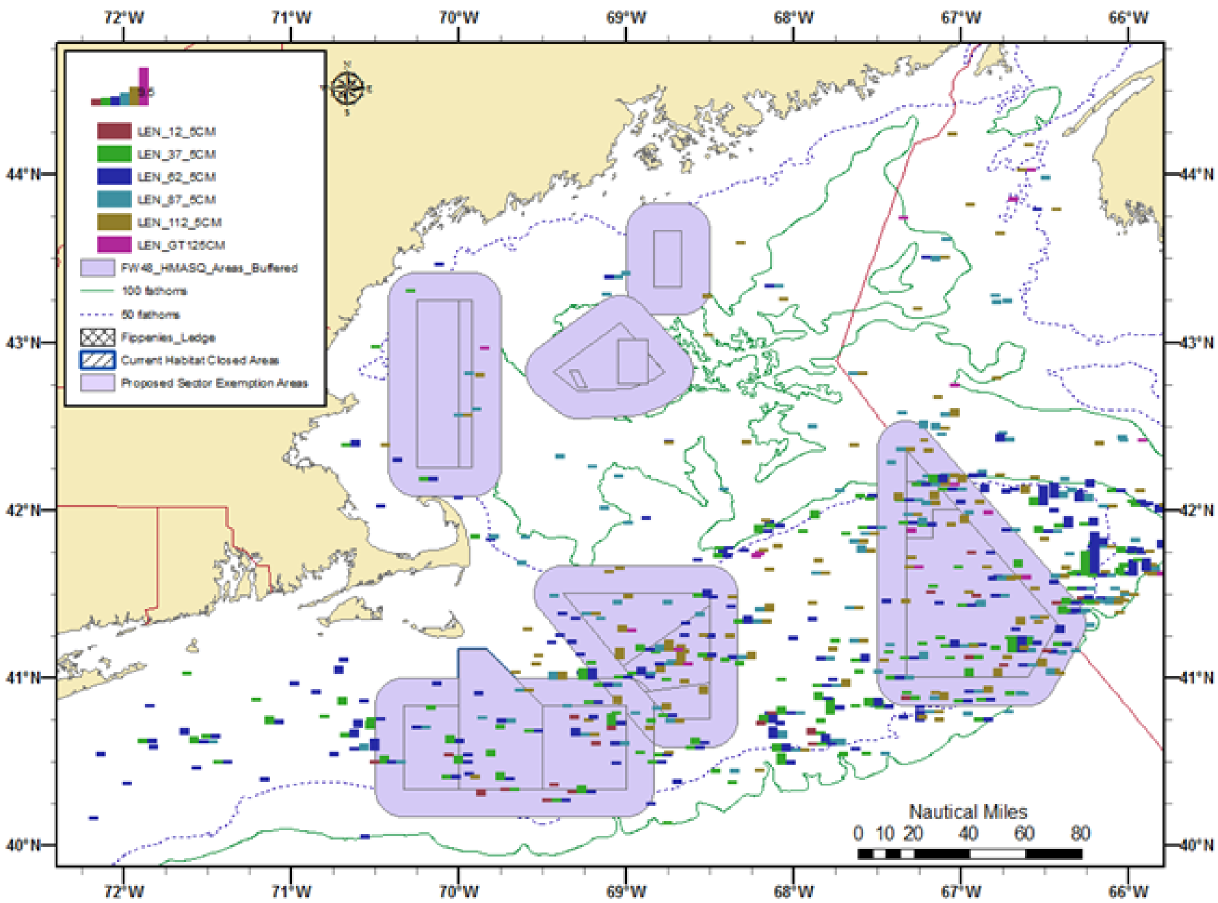


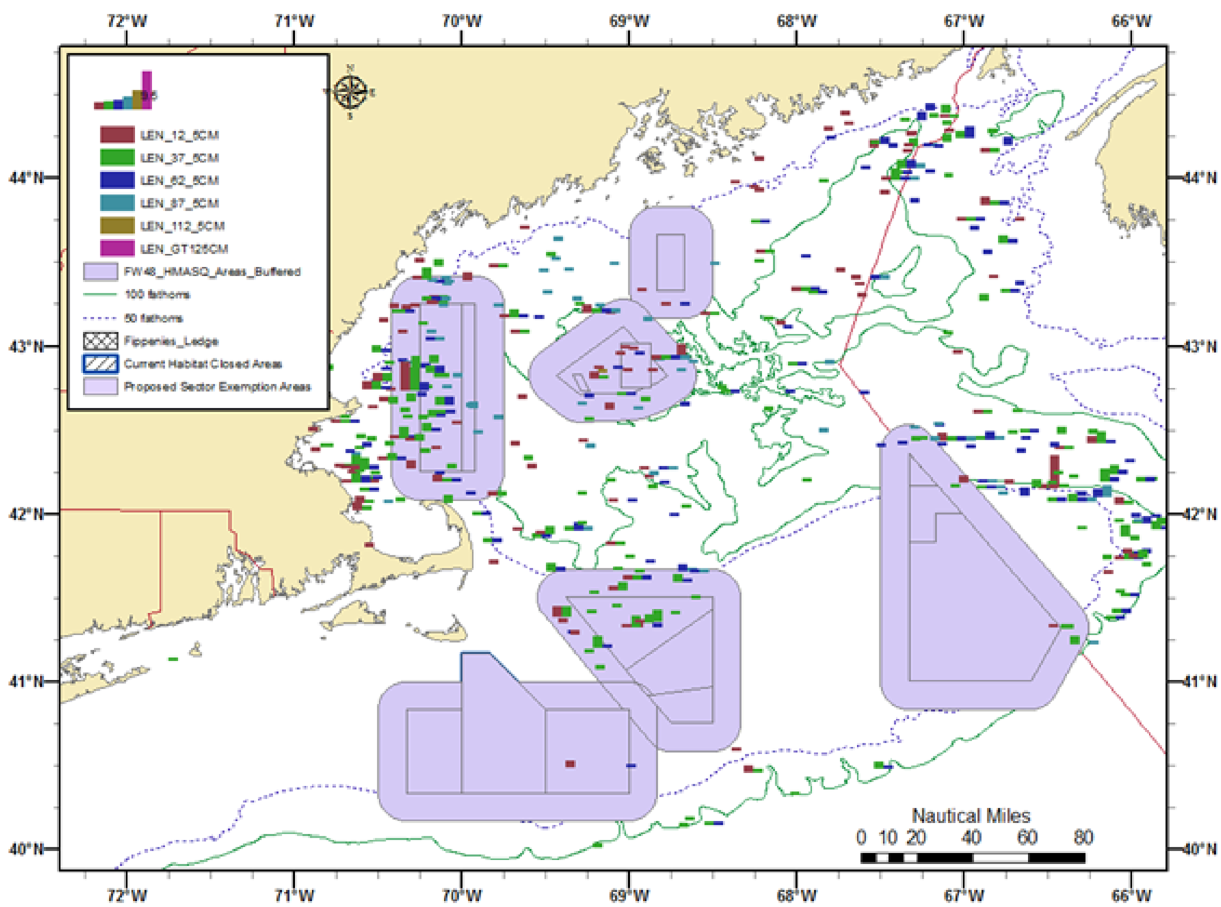
Figure 91 - Geographical distribution of barndoor skate length frequency during 2002-2011 fall surveys.



6.6.1.3.11 Thorny skate

Thorny skate were caught in the spring (Figure 92) and fall surveys throughout the Gulf of Maine and the northern and eastern margin of Georges Bank. Relatively few thorny skate were caught in the proposed sector exemption areas on Georges Bank. In the Gulf of Maine more thorny skate were caught in shallower areas than in the deep basins, areas which overlap the Western Gulf of Maine habitat area of the proposed sector exemption area of Cashes Ledge. Smaller thorny skate were observed on Stellwagen Bank and Jeffries Ledge, with larger thorny skate caught in the spring in the Western Gulf of Maine habitat area. The spring and fall surveys caught no thorny skate in the Western Gulf of Maine proposed sector exemption area. Small thorny skate (i.e < 25 cm) were caught in the Cashes Ledge proposed sector exemption area.

Figure 92 - Geographical distribution of thorny skate length frequency during 2002-2012 spring surveys.



6.6.1.3.12 Wolffish

The survey caught Atlantic wolffish sparsely in the western Gulf of Maine, north of Closed Area I, in and around the Cashes Ledge area and on eastern Georges Bank in Canada, during the spring (Figure 93) and fall (Figure 95). Wolfish were most abundance in an area around Tillies Bank and southern Jeffries Ledge, an area overlapping the Western Gulf of Maine habitat closure area. Many of these wolffish were immature (Figure 94). The surveys caught no wolffish in the Western Gulf of Maine and Georges Bank proposed sector exemption areas. The fall survey caught some small wolffish in the Cashes Ledge proposed sector exemption area.

Figure 93 - Geographical distribution of Atlantic wolffish length frequency during 2002-2012 spring surveys.

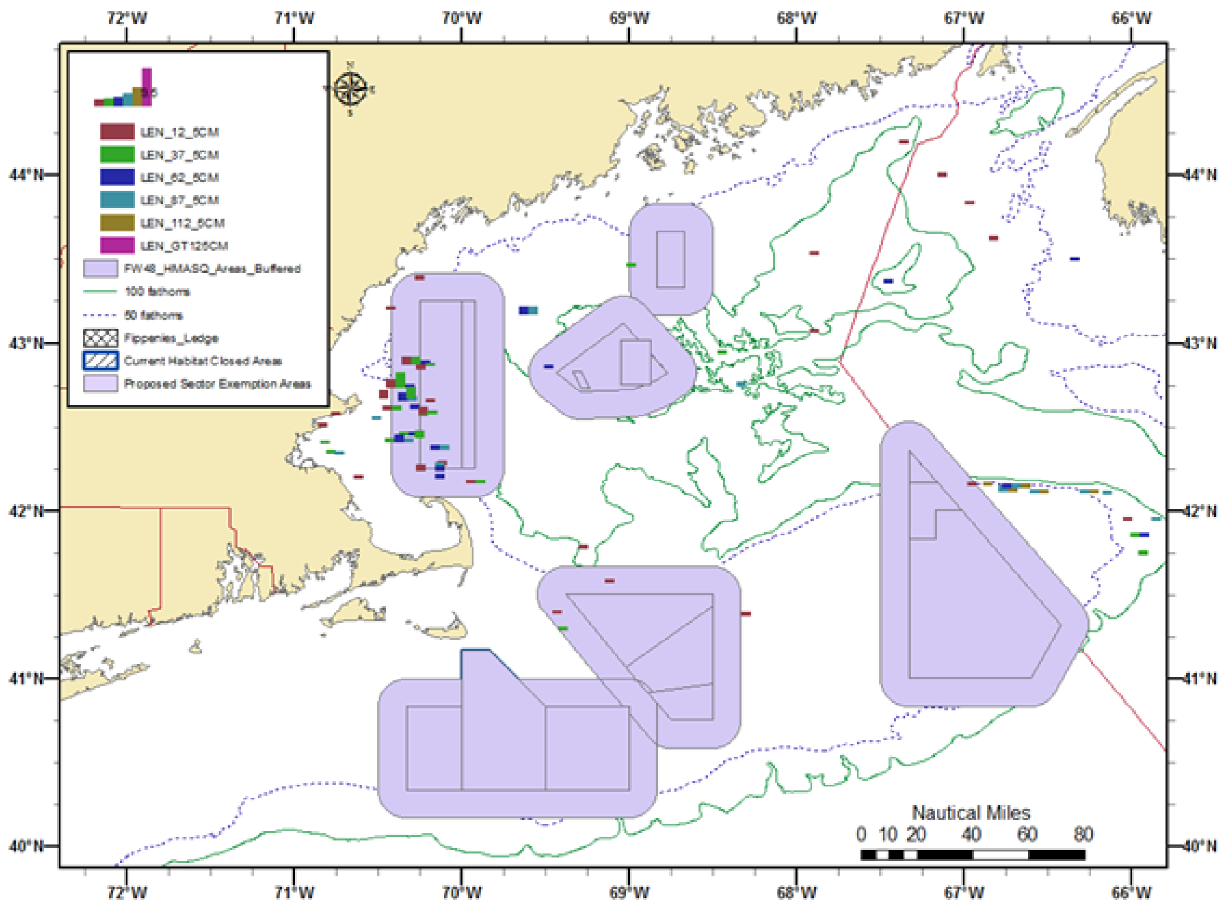


Figure 94 - Geographical distribution of Atlantic wolffish maturity stage during 2002-2012 spring surveys

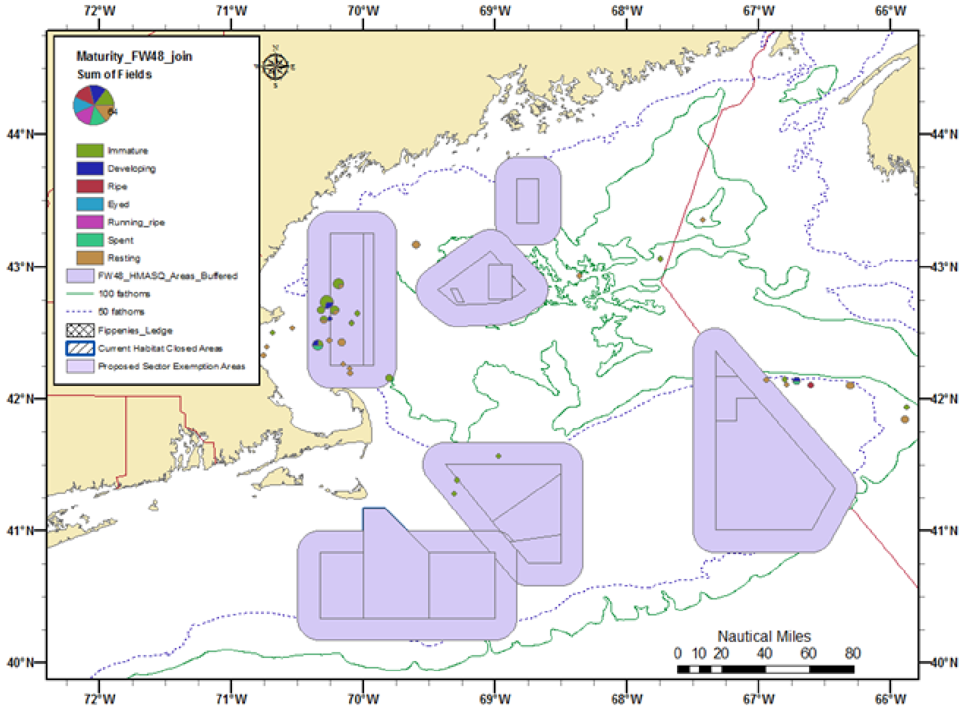


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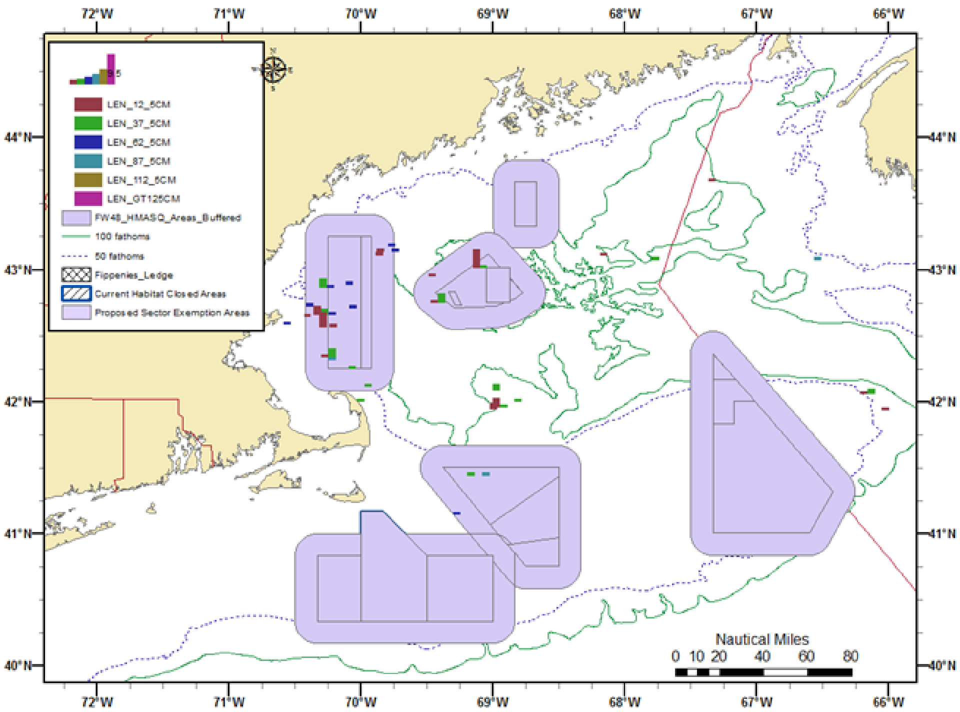
Figure 95 - Geographical distribution of Atlantic wolffish length frequency during 2002-2011 fall surveys.



6.6.1.3.13 White Hake

In addition to the SE edge of Georges Bank (outside of the year round groundfish closed areas) and relatively few white hake inside of the Western Gulf of Maine, Cashes Ledge and Jeffries Bank closed areas, most white hake in the spring survey are caught offshore (Figure 96). Concentrations of large female white hake are apparent SE and S of the Western Gulf of Maine and Cashes Ledge Areas. High concentrations of large female white hake are also seen just north of Closed Area II, outside of the "triangle" that would become a proposed sector exemption area. Few developing fish were observed in the Gulf of Maine closed areas and if anything the larger female white hake were caught by the survey in open fishing areas. Some developing females were observed north of Closed Area II.

The female white hake distribution is more spread out into shallower waters in the fall, with more large resting females caught by the fall survey in the Western Gulf of Maine area, including the proposed sector exemption areas, and in the Cashes Ledge closed area (Figure 97). Smaller, immature white hake are prevalent in the shallower coastal areas of the Gulf of Maine. The maturity of female white hake in the habitat and proposed sector exemption areas is affected by the length-frequency of white hake in these areas. White hake tend to be somewhat larger at age inside the habitat and proposed sector exemption areas of the Gulf of Maine than in open fishing areas, but this difference may not be statistically significant.

Figure 96 - Geographical distribution of white hake length frequency during 2002-2012 spring surveys.

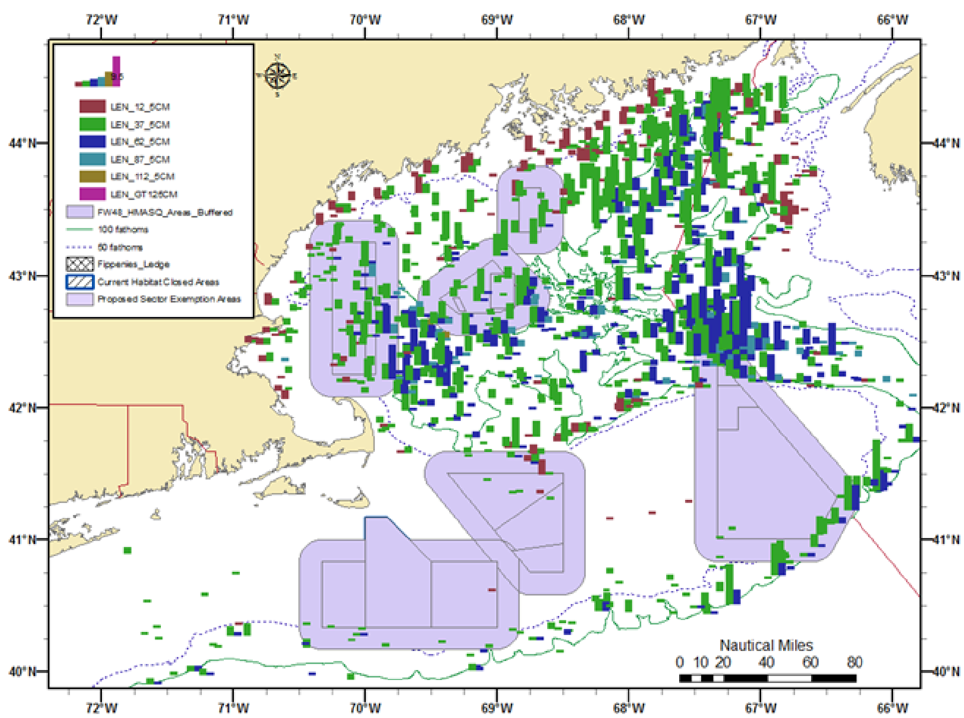
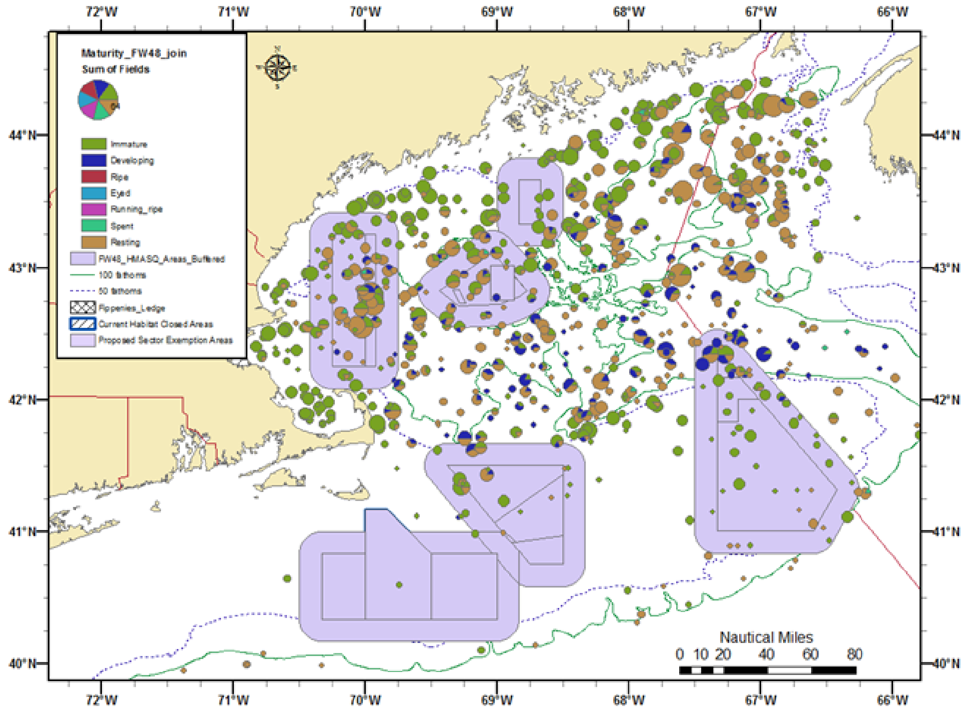


Figure 97 - Geographical distribution of white hake maturity stage during 2002-2011 fall surveys.



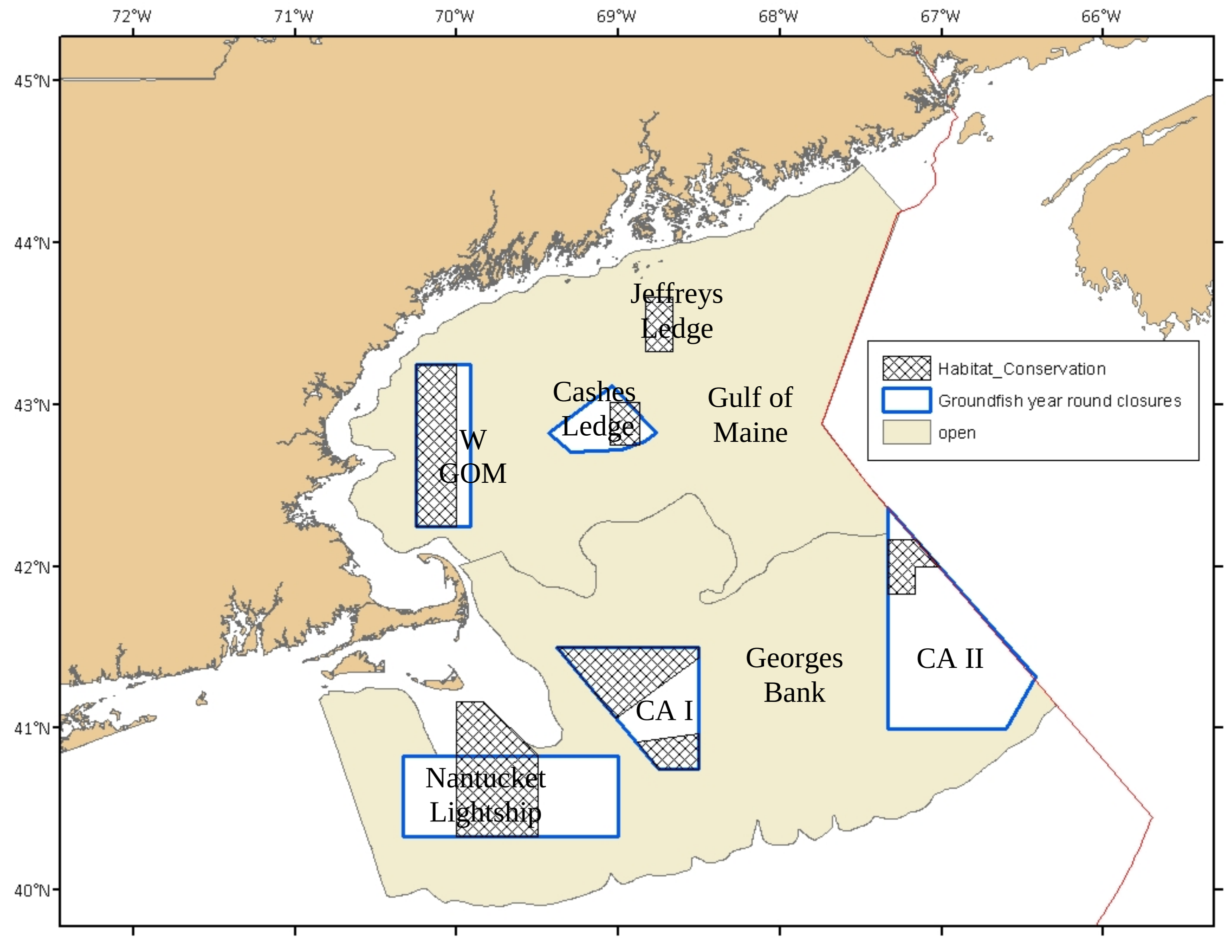
6.6.1.3.14 Smooth Skate

Smooth skate are sparsely caught by the spring and fall surveys throughout the deeper waters of the Gulf of Maine, including some in the Western Gulf of Maine and Cashes Ledge areas, as well as the northern habitat area of Closed Area I and the Cod HAPC and “triangle” proposed sector exemption area of Closed Area II. Differences in length frequencies of skates found in these areas are not observable. Smooth skates are not aged and few maturity observations are available.

6.6.2 Swept-area indices and proportion of biomass inside and outside of closed areas for 23 groundfish species

6.6.2.1 Methods

Northeast Fisheries Science Center (NEFSC) bottom trawl surveys were used to determine swept-area biomass (kg/tow) and abundance (number/tow) indices for 23 groundfish species including 7 skate species (winter, little, smooth, thorny, clearnose, rosette and barndoor), 15 species in the Northeast groundfish complex (haddock, Atlantic cod, pollock, white hake, red hake, silver hake, offshore hake, redfish, ocean pout, yellowtail flounder, winter flounder, witch flounder, windowpane flounder, American plaice and Atlantic halibut), as well as monkfish. Swept-area estimates were analyzed individually for each of 5 year-round groundfish closed areas (Nantucket Lightship Area, Closed Area I, Closed Area II, Cashes Ledge, and Western Gulf of Maine area), 7 habitat conservation areas (NLCA Hab, CAI Hab N, CAI Hab S, CA II Hab, WGOM Hab, Cashes Hab, and Jeffreys Ledge) as well as two open areas: Georges Bank and Gulf of Maine (see figure below). Data was aggregated across the years 2005-2011 in order to include sufficient data to estimate mean swept-area biomass inside and outside of each closed area by species and by spring and fall surveys.



We also expanded mean swept-area biomass and abundance indices to total mean biomass (*B*) for each closed or open area using the following equation:

EQ. 1. $$B = \left(\frac{I}{q}\right)\left(\frac{A}{a}\right)$$

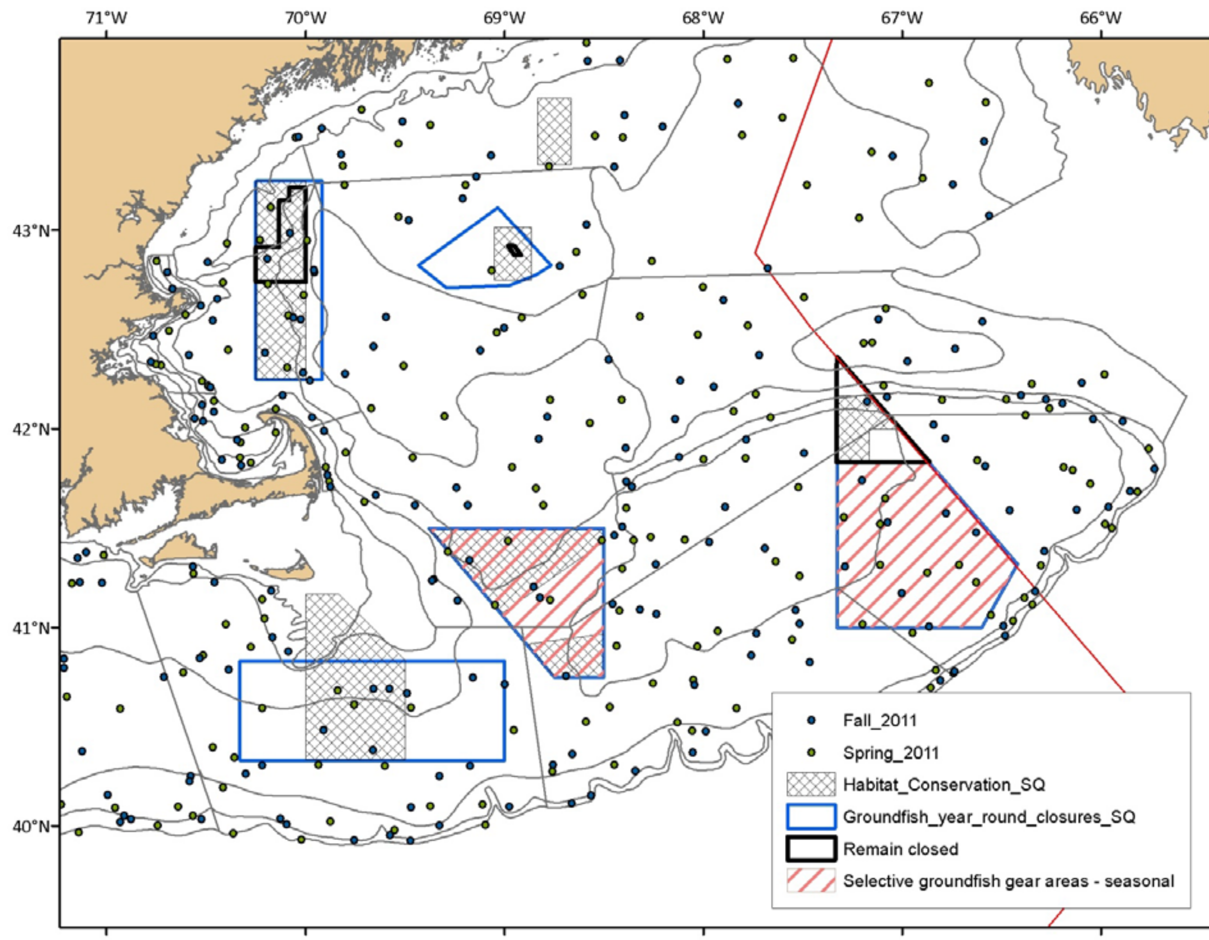
Where *I* is the average swept-area biomass index for an area (kg/tow), *q* is the catchability coefficient (set to 1, assuming little herding affect outside of the bridal sweep of the survey bottom trawl net), *A* is the area of a closed or open area (km^2), and *a* is the swept area of the bottom trawl gear during a standard R/V Albatross tow (0.0384 km^2). The areas for each closed area as well as the expansion of *A/a* are below:

Name	Area (km^2)	A/a
Cashes Ledge CA	1373.07	35757.03
Closed Area I	3938.98	102577.60
Closed Area II	6862.19	178702.86
Nantucket Lightship CA	6247.79	162702.86
Western Gulf of Maine CA	3029.63	78896.61
CAI North	1937.35	50451.82
CAI South	583.68	15200.00
CAII Hab	641.44	16704.17
Cashes Ledge Hab	443.34	11545.31
Jefferys Ledge Hab	498.80	12989.58
Nantucket Lightship Hab	3386.81	88198.18
Western Gulf of Maine Hab	2272.28	59173.96
Georges Bank Open	79490.30	2070059.90
Gulf of Maine Open	80997.94	2109321.35

Our analyses resulted in two outputs. First were mean NEFSC bottom trawl survey biomass and abundance indices (survey CPUEs) from each of the closed and open areas, with variance estimates. The second were total swept-area biomass and abundance estimates, as expanded above from the spring and fall surveys. For each species, we then calculated a ratio of mean biomass inside each closed area to the mean biomass in the corresponding open area.

6.6.2.2 Results

NEFSC bottom trawl surveys were randomly distributed across the Georges Bank and Gulf of Maine areas, however the small areas of Cashes Ledge and Jeffreys Ledge closed areas and numerous habitat closed areas resulted in few tows annually (see 2011 example map below).


71°W
70°W
69°W
68°W
67°W
66°W
43°N
42°N
41°N
40°N
Fall_2011
Spring_2011
Habitat_Conservation_SQ
Groundfish_year_round_closures_SQ
Remain closed
Selective groundfish gear areas - seasonal

The number of stations that were conducted in each area between 2005 and 2011 are summarized in the following table:

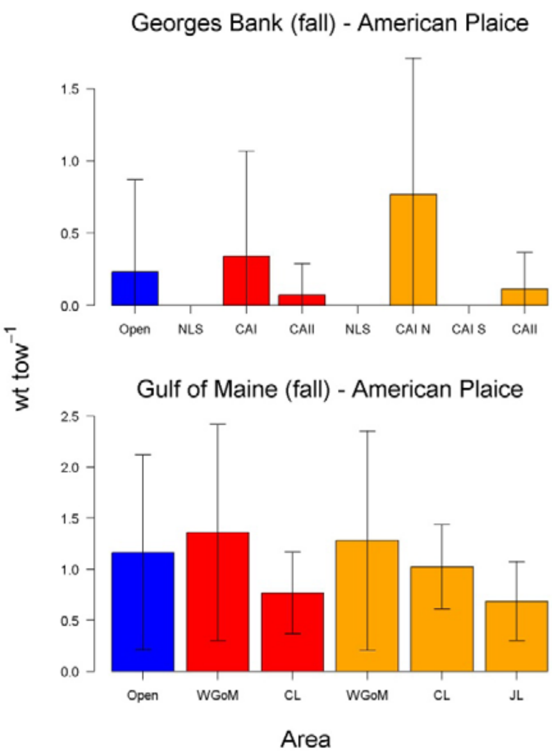
		n=860	
Spring	**Closed**	**Habitat**	**Open**
Cashes Ledge	7	3	
Closed Area I	36	15/3	
Closed Area II	67	7	
Nantucket Lightship	30	15	
Western Gulf of Maine	37	30	
Jefferys Ledge		2	
Georges Bank			402
Gulf of Maine			277

		n=840	
Fall	**Closed**	**Habitat**	**Open**
Cashes Ledge	8	3	
Closed Area I	27	12/4	
Closed Area II	73	5	
Nantucket Lightship	49	20	
Western Gulf of Maine	40	30	
Jefferys Ledge		3	
Georges Bank			382
Gulf of Maine			254

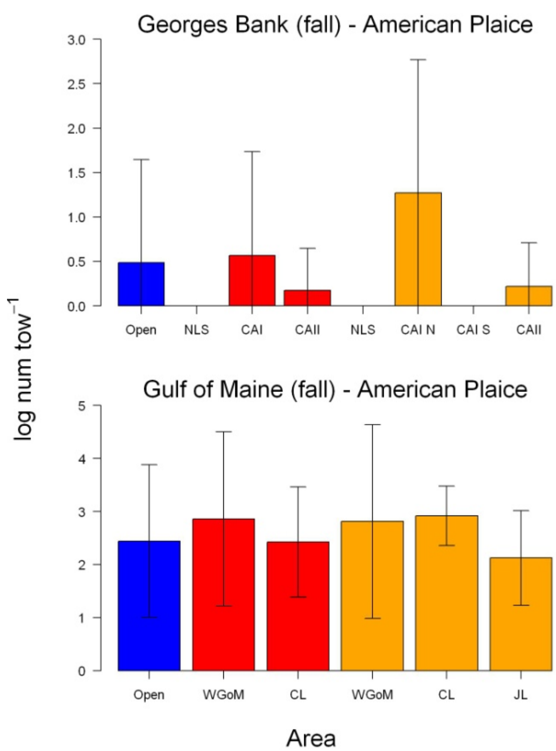
NEFSC survey CPUE in terms of mean biomass (kg/tow) and abundance (number/tow) indices were often higher in closed areas than open, although variance was high, particularly in smaller closed areas and habitat areas. Blue bars represent open areas, red bars represent closed areas and orange bars represent habitat conservation areas. No data were available for clearnose skate. Very little difference in trend was seen between biomass and abundance indices since these were averaged over 2005 to 2011 (Figure 98).

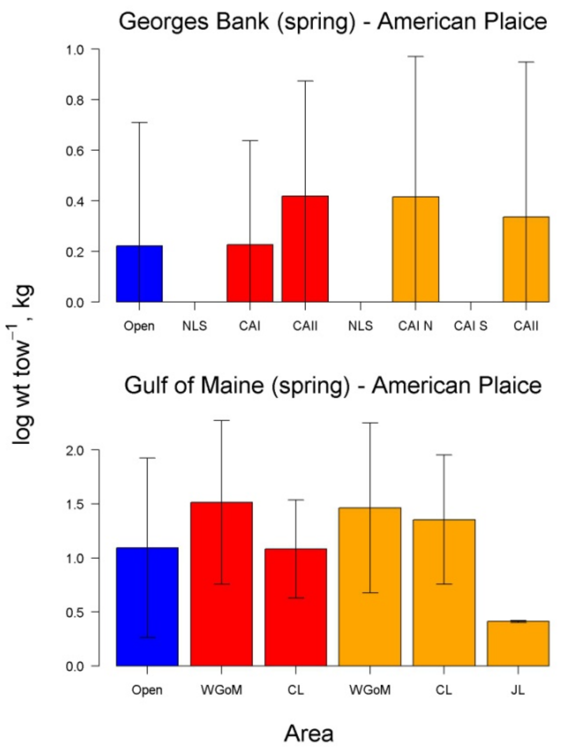
Figure 98 – Average weight and number per tow by stock on spring and fall surveys, 2005 – 2011. Blue = open area; Red = year round closed area; Orange = EFH closure area.

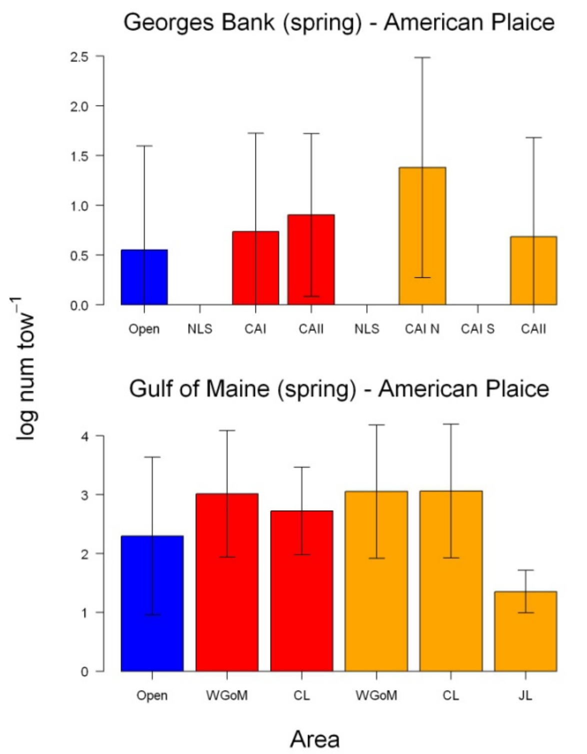
Mean Biomass CPUE Index 2005-2011



Mean Abundance CPUE Index 2005-2011

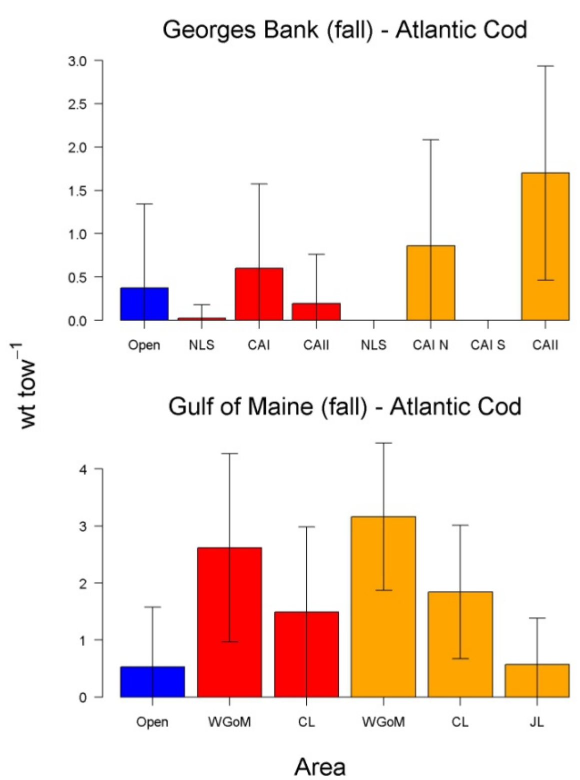


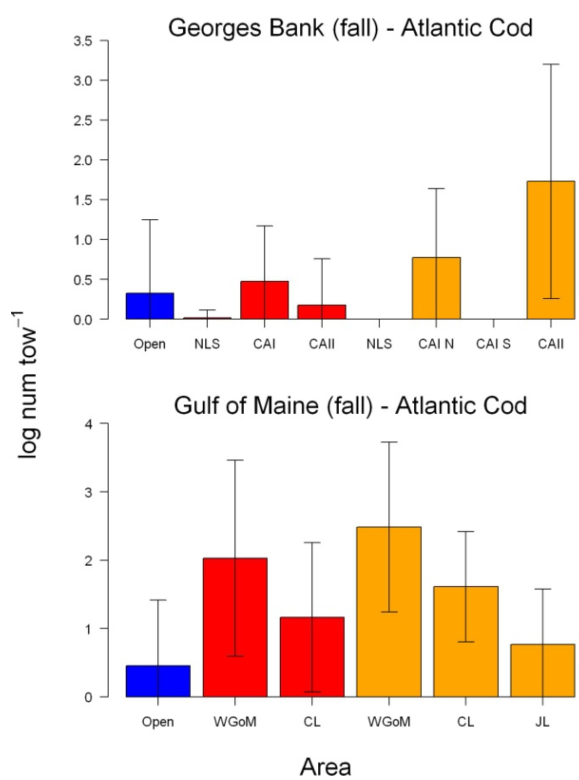


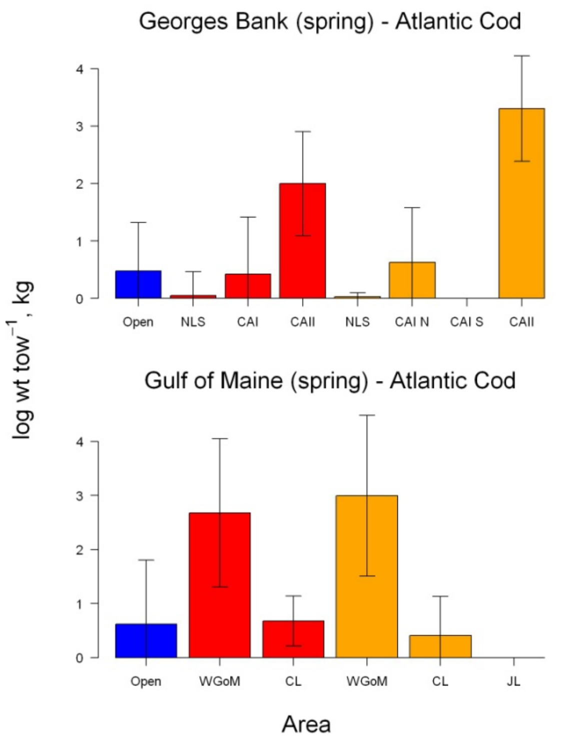


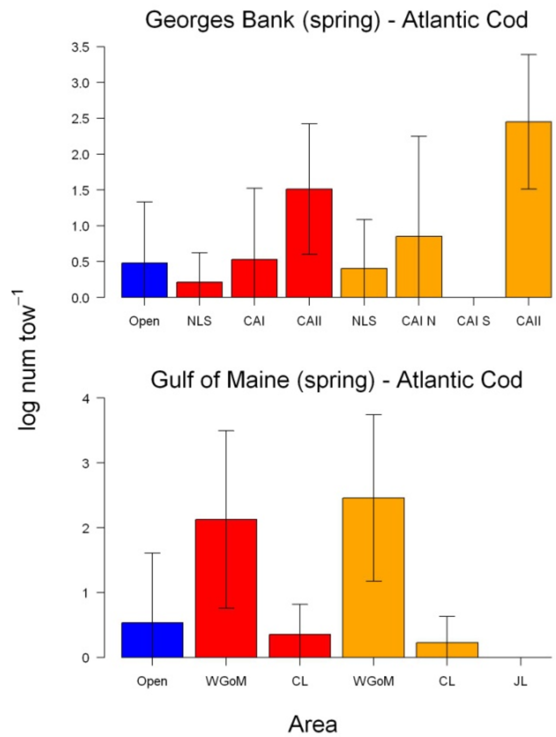
Mean Biomass CPUE Index 2005-2011

Mean Abundance CPUE Index 2005-2011



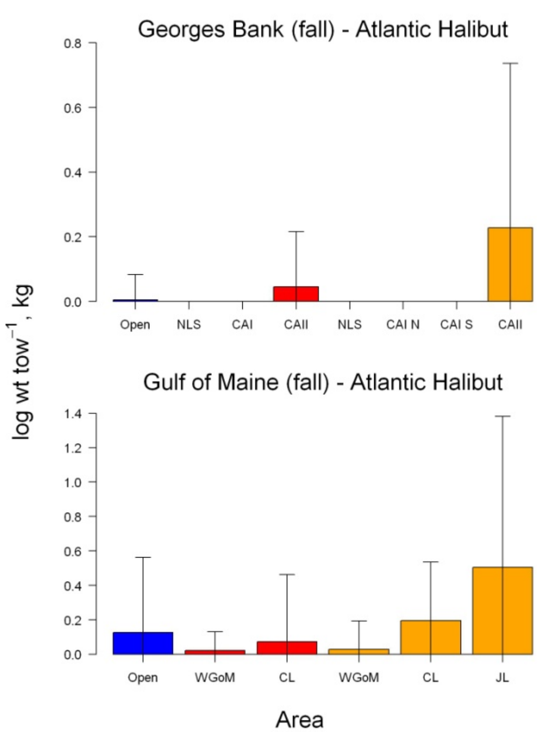


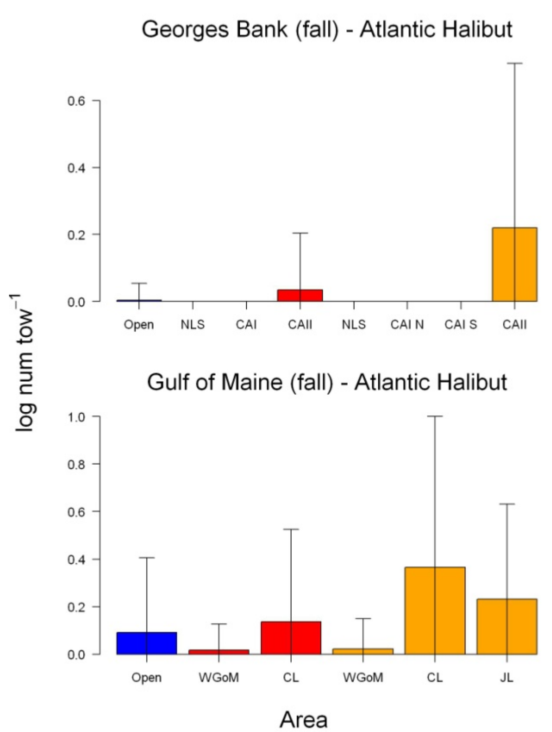


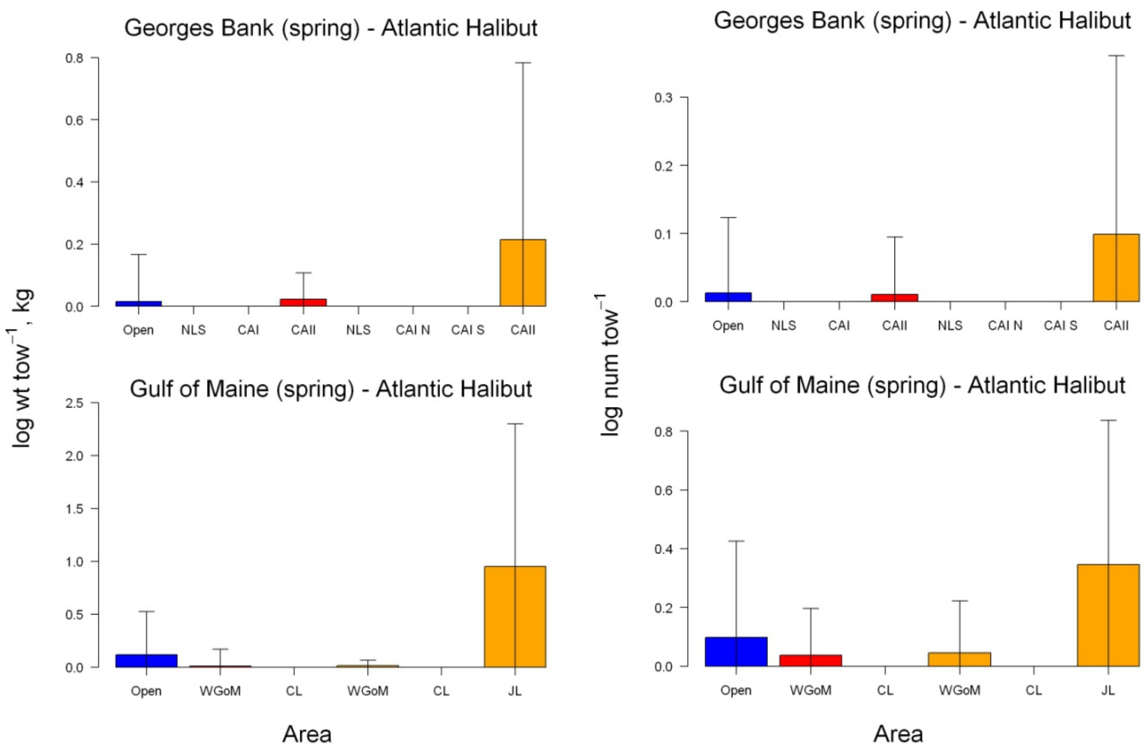


Mean Biomass CPUE Index 2005-2011

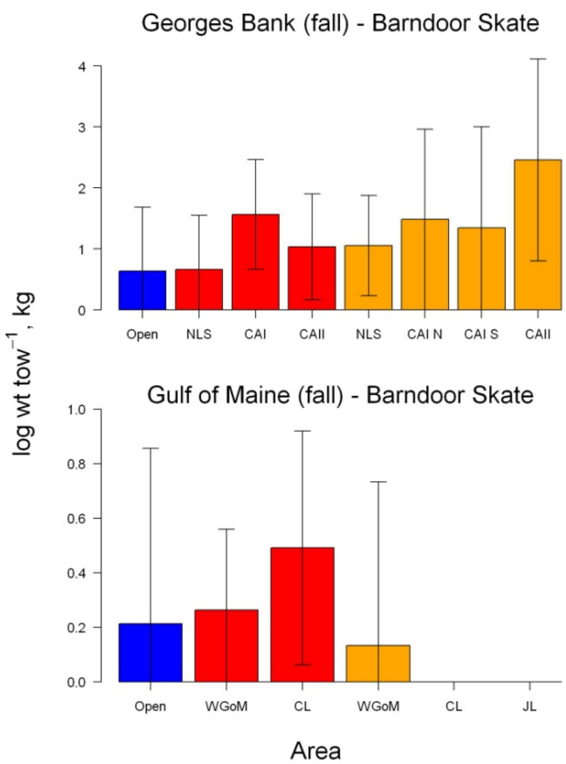
Mean Abundance CPUE Index 2005-2011



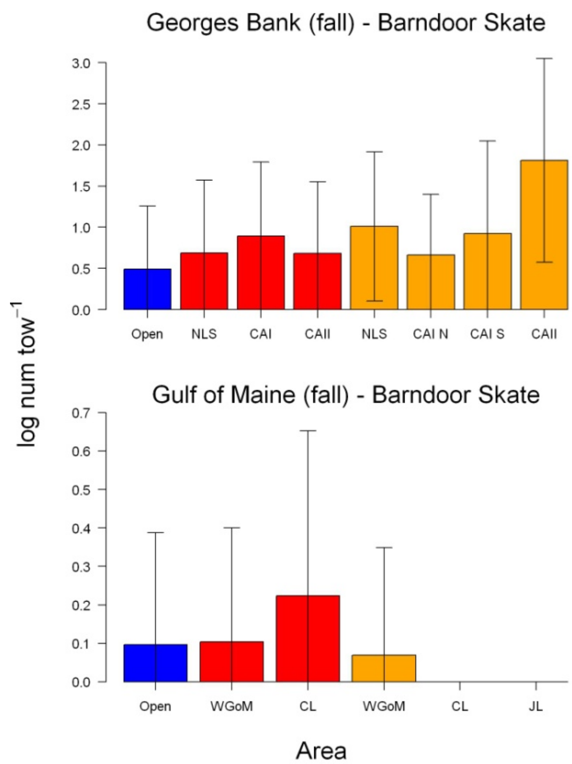


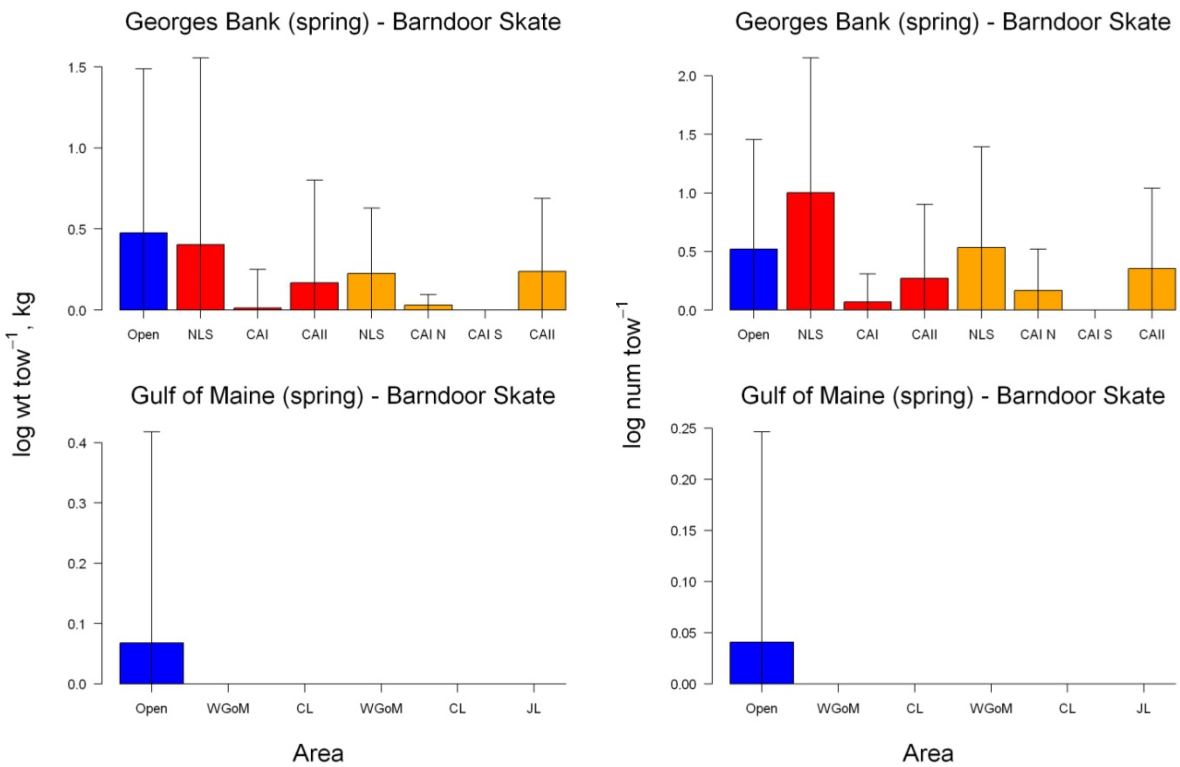

Georges Bank (spring) - Atlantic Halibut
Georges Bank (spring) - Atlantic Halibut
Gulf of Maine (spring) - Atlantic Halibut
Gulf of Maine (spring) - Atlantic Halibut
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
CAI N
CAI S
WGoM
CL
JL
Area
Area

Mean Biomass CPUE Index 2005-2011

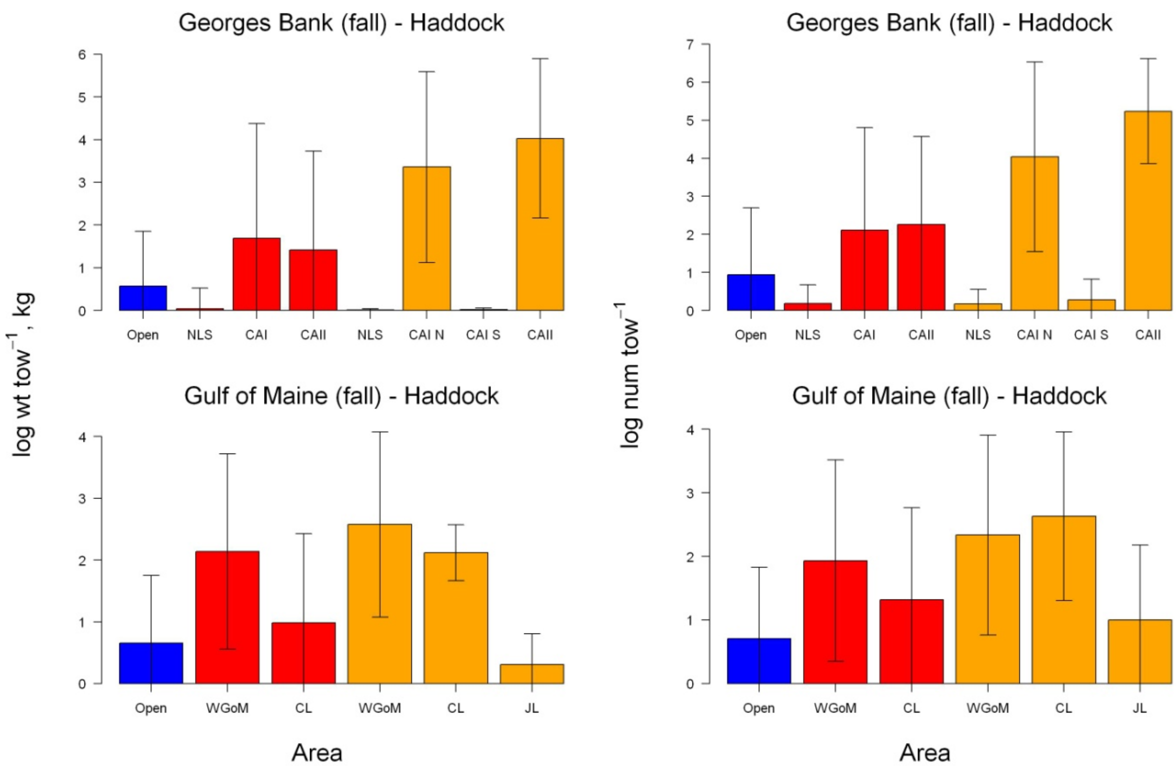


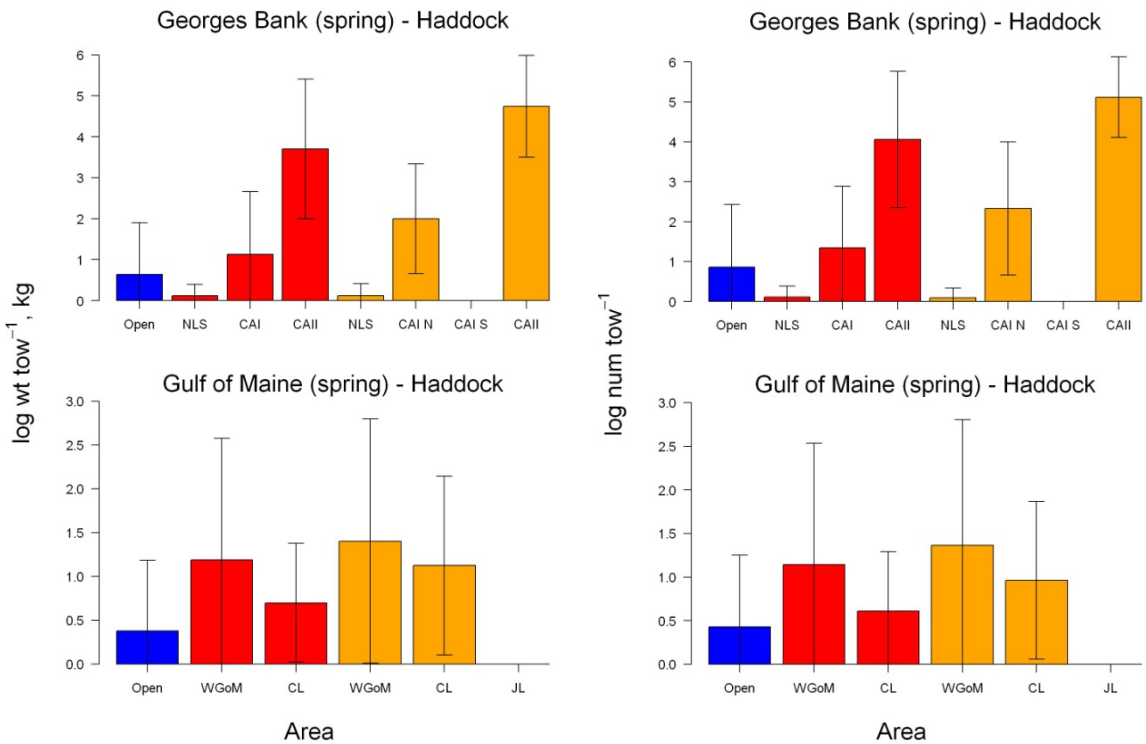
Mean Abundance CPUE Index 2005-2011



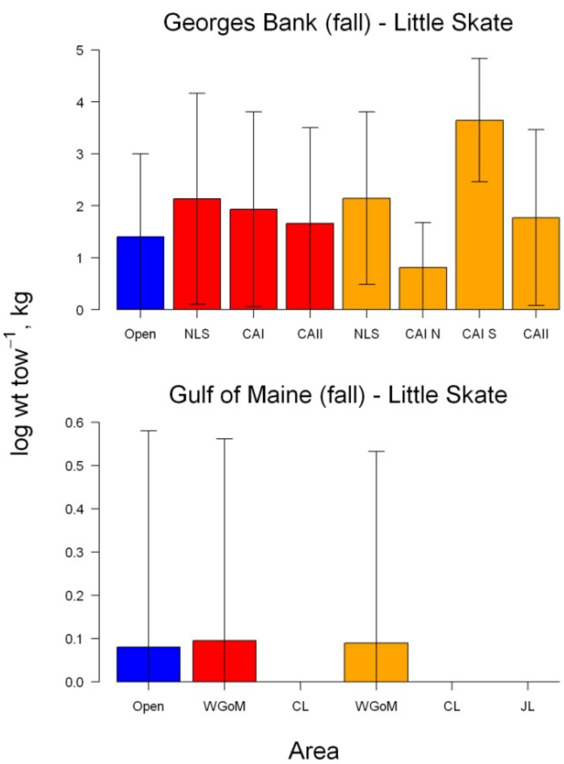

Georges Bank (spring) - Barndoor Skate
Georges Bank (spring) - Barndoor Skate
Gulf of Maine (spring) - Barndoor Skate
Gulf of Maine (spring) - Barndoor Skate
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
WGoM
CL
WGoM
CL
JL
Area
Area

Mean Biomass CPUE Index 2005-2011 Mean Abundance CPUE Index 2005-2011

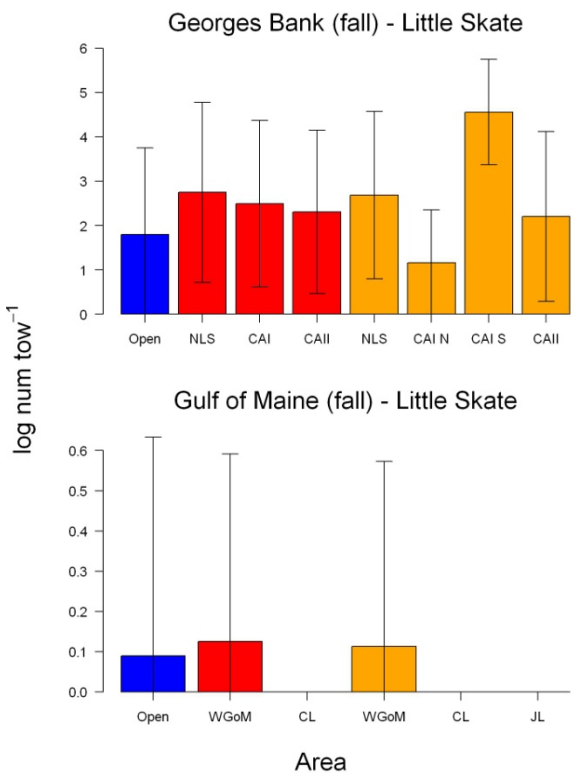


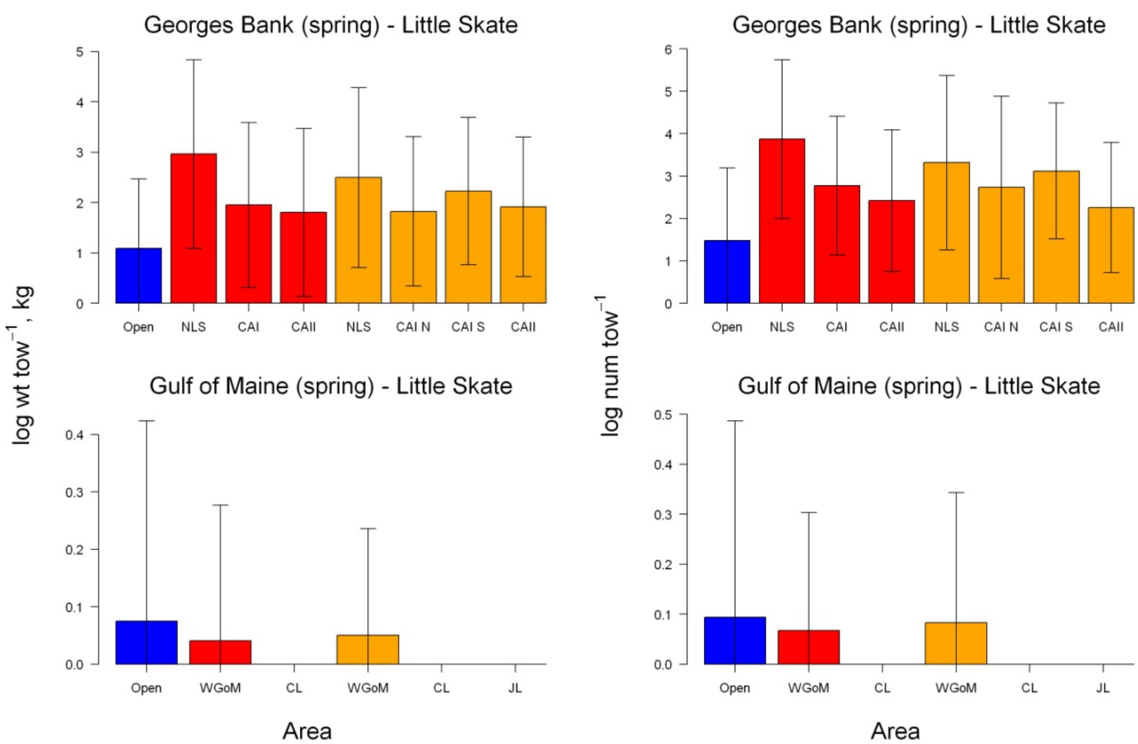

Georges Bank (spring) - Haddock
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log wt tow^{-1}, kg
Gulf of Maine (spring) - Haddock
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Haddock
log num tow^{-1}
Gulf of Maine (spring) - Haddock
Area

Mean Biomass CPUE Index 2005-2011

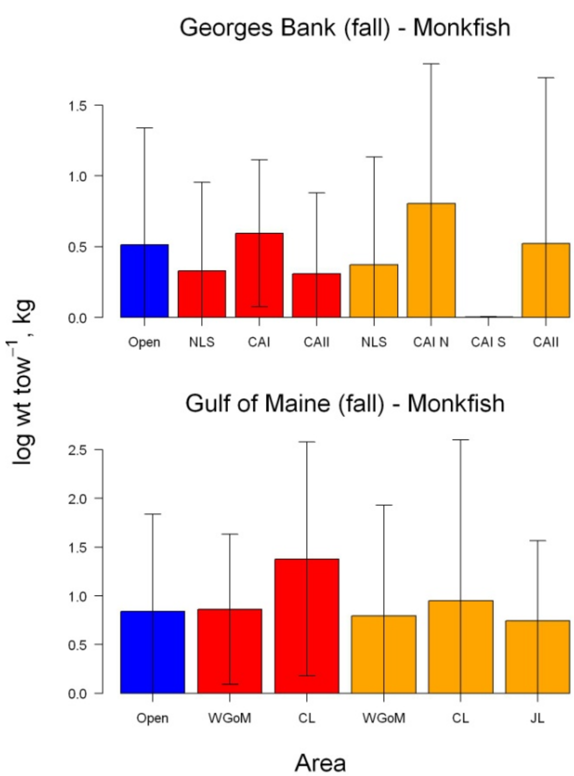


Mean Abundance CPUE Index 2005-2011

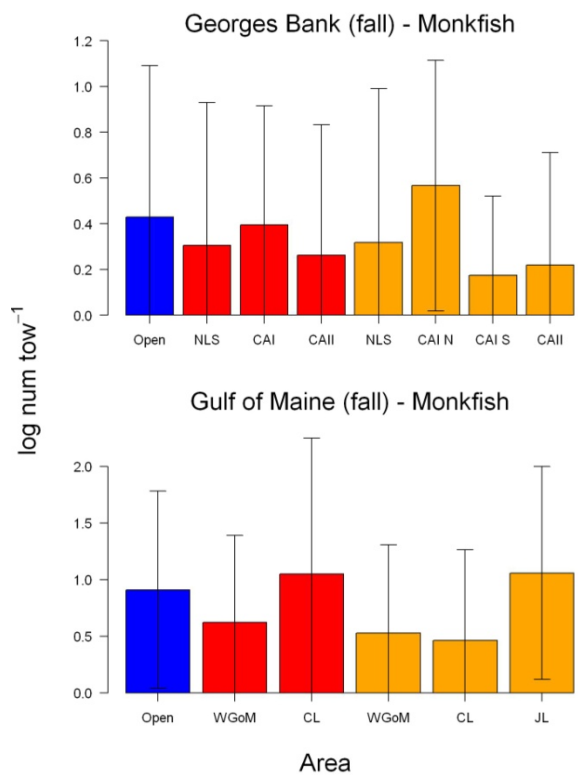


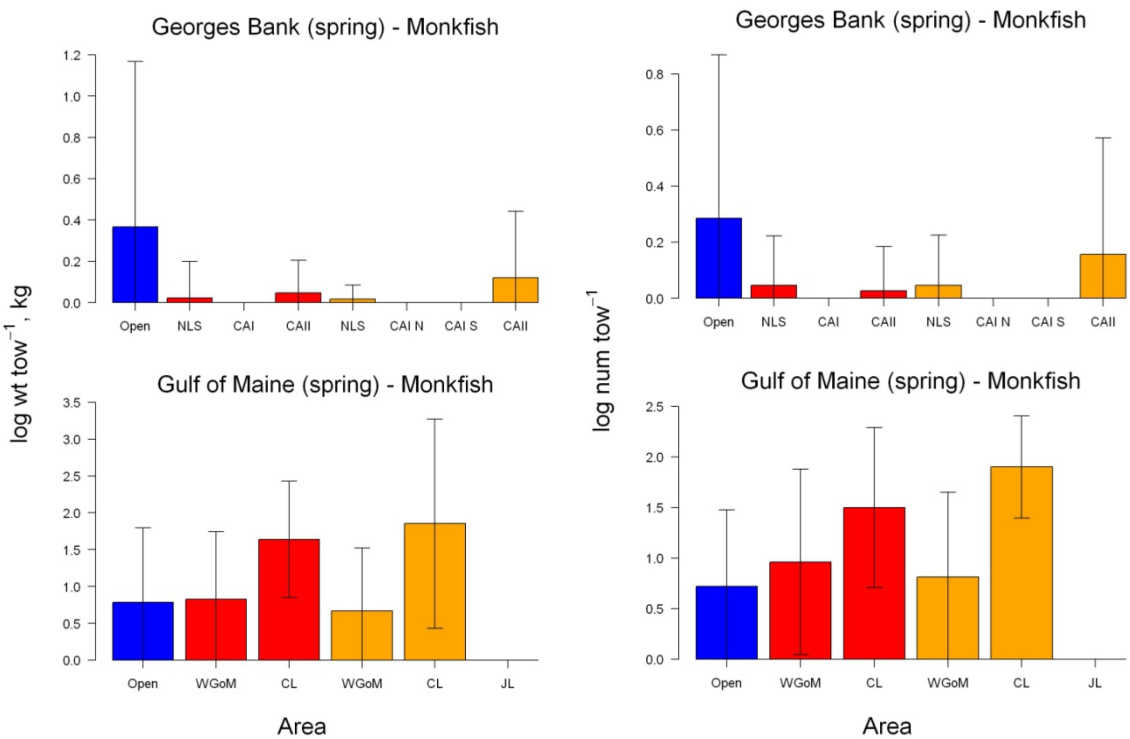

Georges Bank (spring) - Little Skate
Georges Bank (spring) - Little Skate
Gulf of Maine (spring) - Little Skate
Gulf of Maine (spring) - Little Skate
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
Open
WGoM
CL
WGoM
CL
JL
Area
Area

Mean Biomass CPUE Index 2005-2011

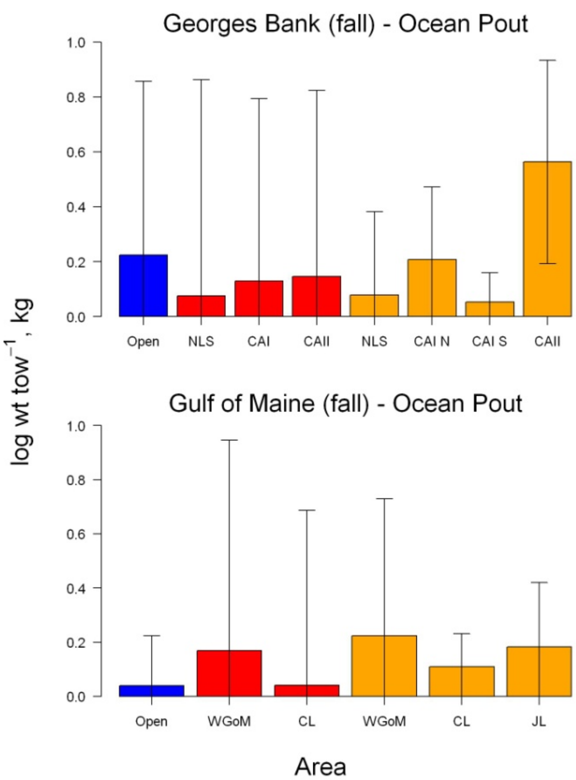


Mean Abundance CPUE Index 2005-2011

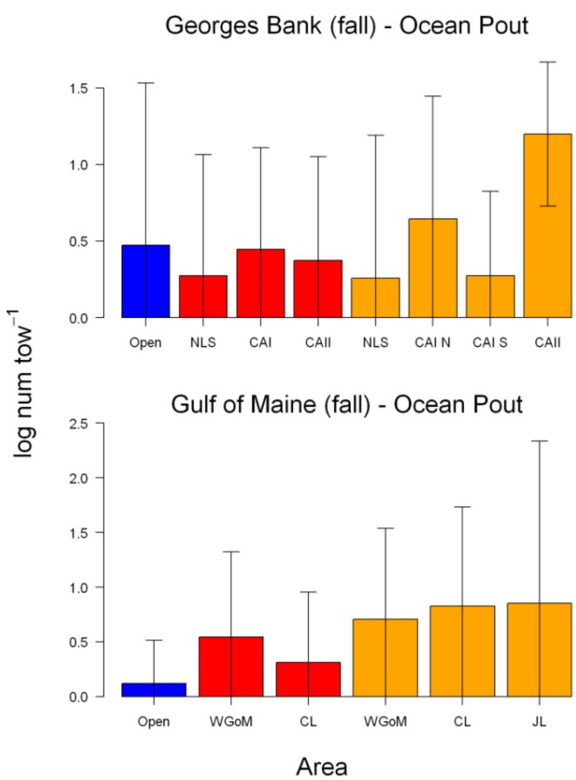


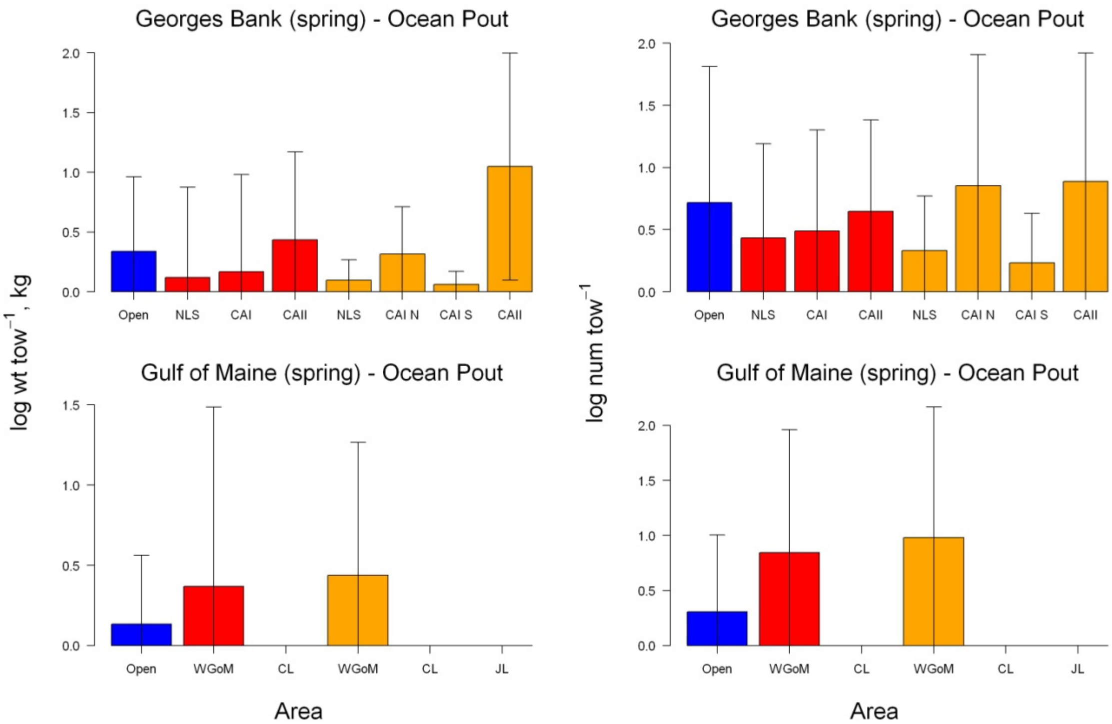

Georges Bank (spring) - Monkfish
Gulf of Maine (spring) - Monkfish
log wt tow^{-1}, kg
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Monkfish
Gulf of Maine (spring) - Monkfish
log num tow^{-1}
Area

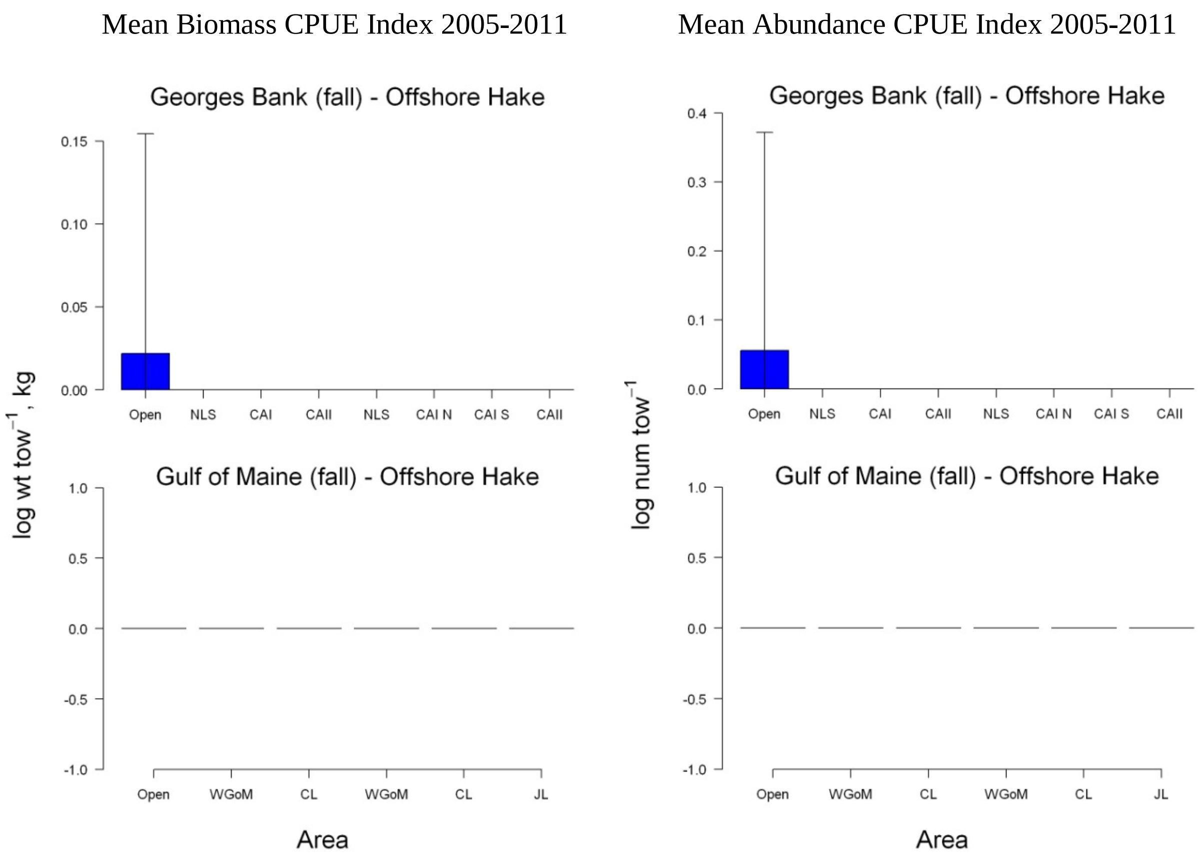
Mean Biomass CPUE Index 2005-2011

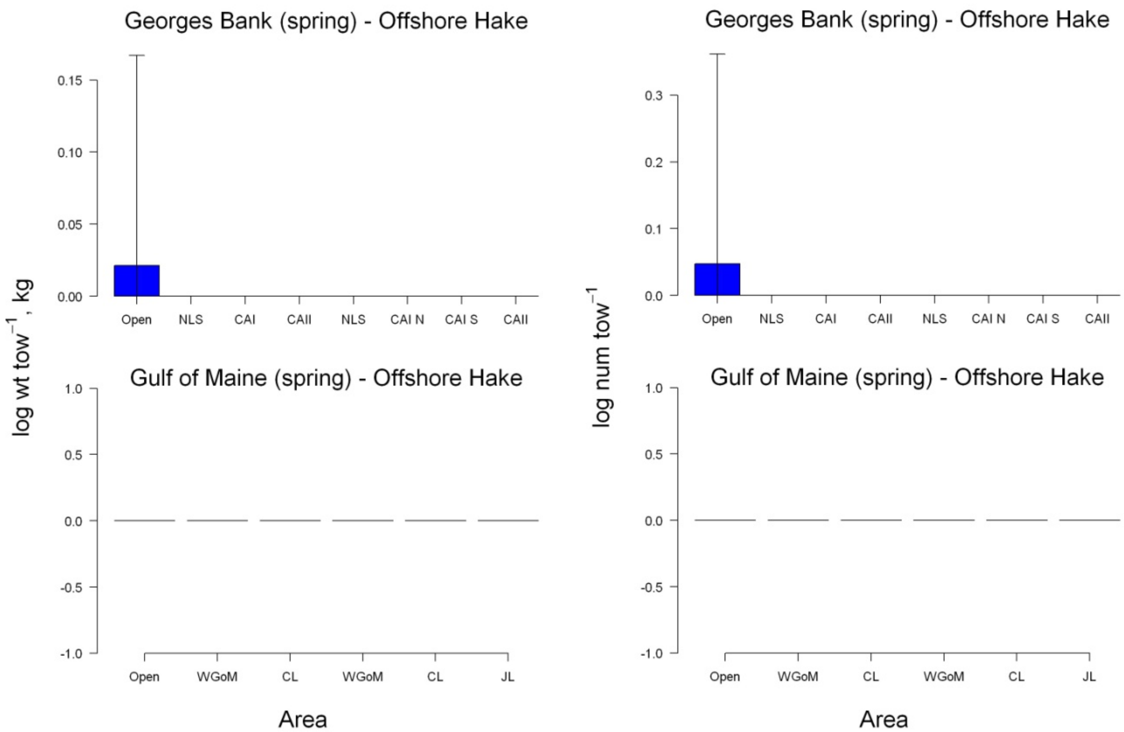


Mean Abundance CPUE Index 2005-2011

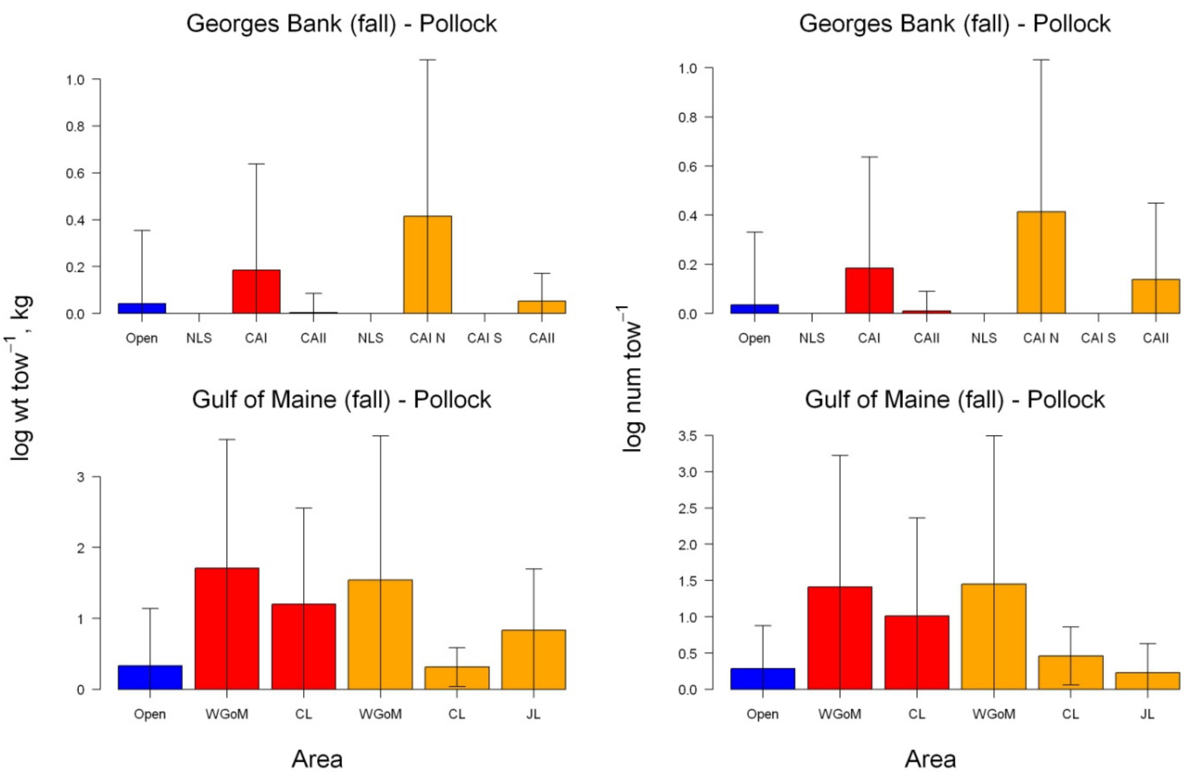


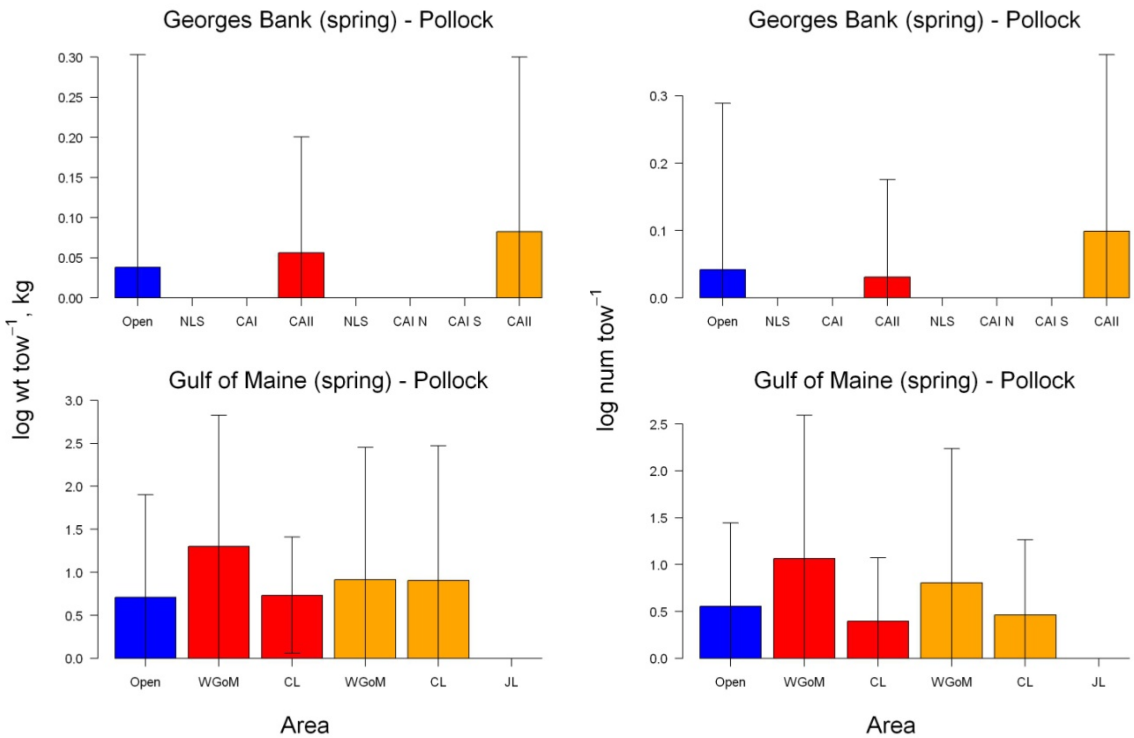

Georges Bank (spring) - Ocean Pout
Gulf of Maine (spring) - Ocean Pout
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
CAI N
CAI S
WGoM
CL
JL
Area


Mean Biomass CPUE Index 2005-2011
Mean Abundance CPUE Index 2005-2011
Georges Bank (fall) - Offshore Hake
Gulf of Maine (fall) - Offshore Hake
log wt tow^{-1}, kg
log num tow^{-1}
0.15
0.10
0.05
0.00
0.4
0.3
0.2
0.1
0.0
1.0
0.5
-0.5
-1.0
Open NLS CAI CAII NLS CAI N CAI S CAII
Open WGoM CL WGoM CL JL
Area


Georges Bank (spring) - Offshore Hake
0.15
0.10
0.05
0.00
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log wt tow^{-1}, kg
Gulf of Maine (spring) - Offshore Hake
1.0
0.5
0.0
-0.5
-1.0
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Offshore Hake
0.3
0.2
0.1
0.0
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log num tow^{-1}
Gulf of Maine (spring) - Offshore Hake
1.0
0.5
0.0
-0.5
-1.0
Open
WGoM
CL
WGoM
CL
JL
Area

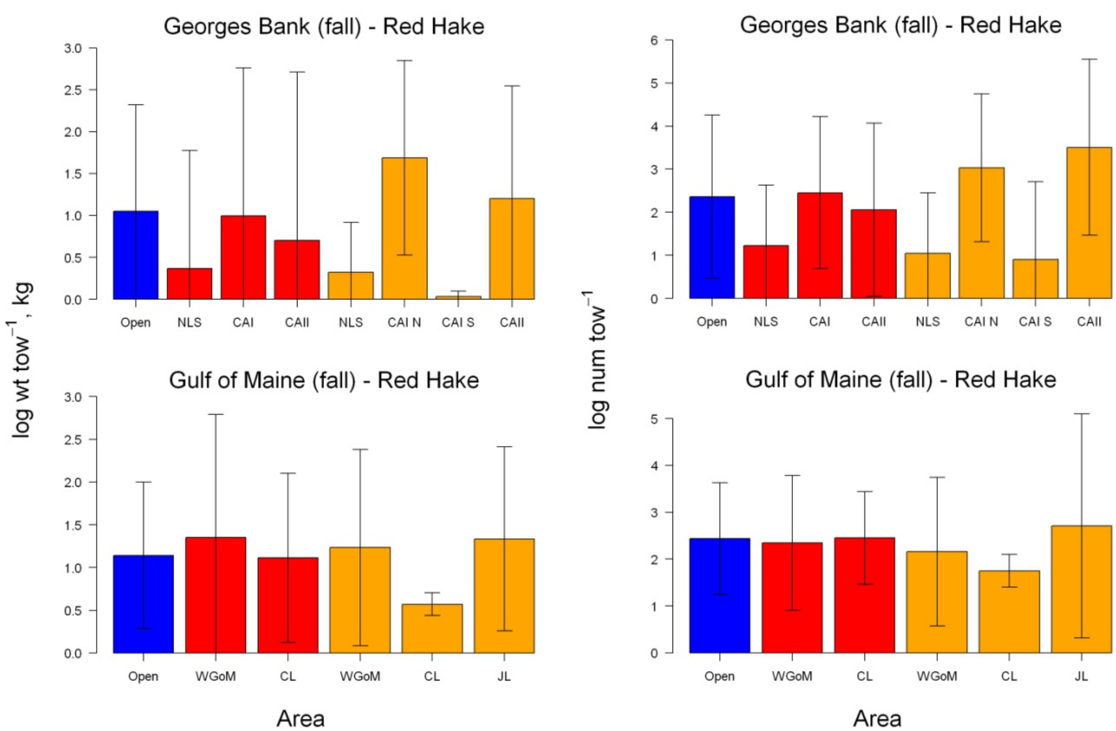
Mean Biomass CPUE Index 2005-2011 Mean Abundance CPUE Index 2005-2011

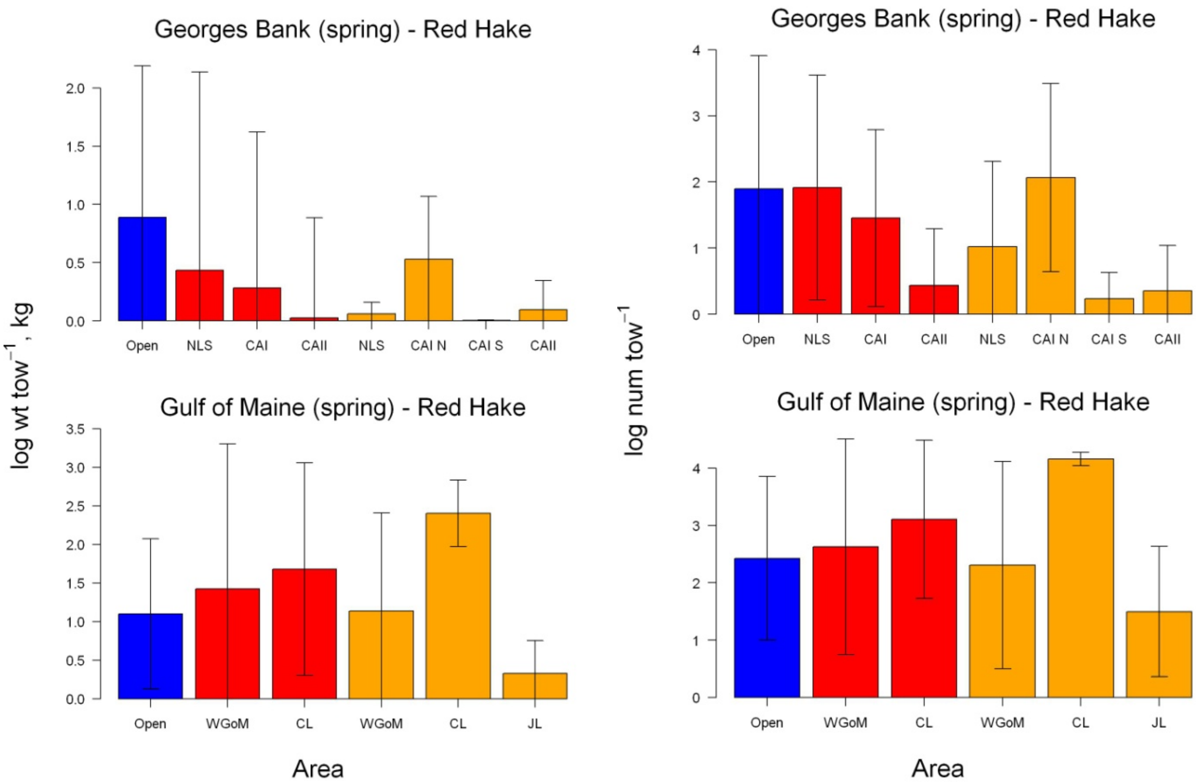



Georges Bank (spring) - Pollock
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log wt tow^{-1}, kg
Gulf of Maine (spring) - Pollock
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Pollock
0.3
0.2
0.1
0.0
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log num tow^{-1}
Gulf of Maine (spring) - Pollock
2.5
2.0
1.5
1.0
0.5
0.0
Open
WGoM
CL
WGoM
CL
JL
Area

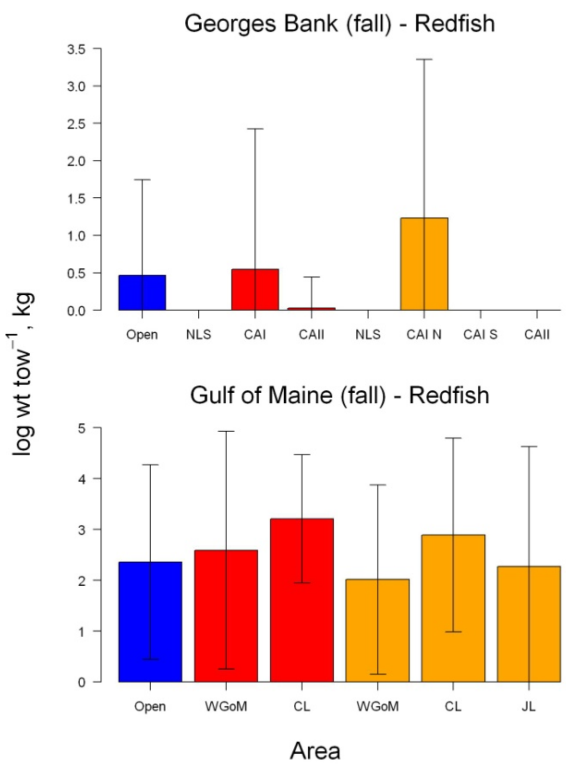
Mean Biomass CPUE Index 2005-2011

Mean Abundance CPUE Index 2005-2011

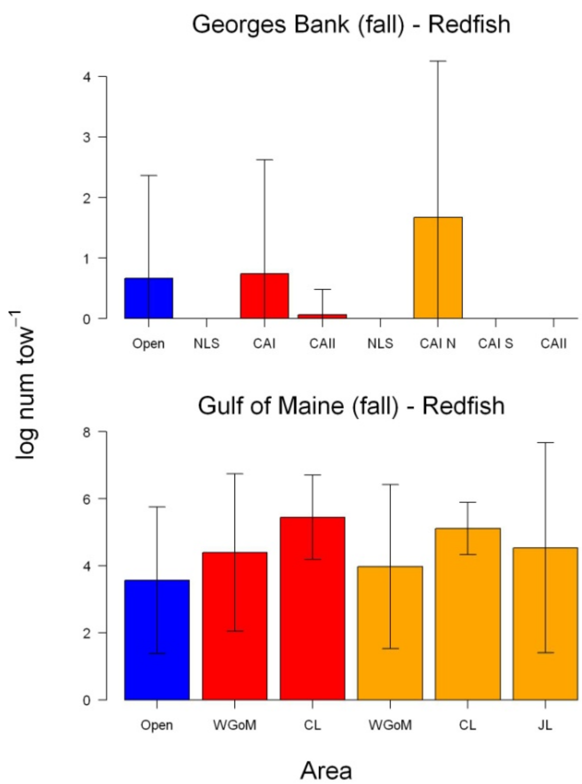


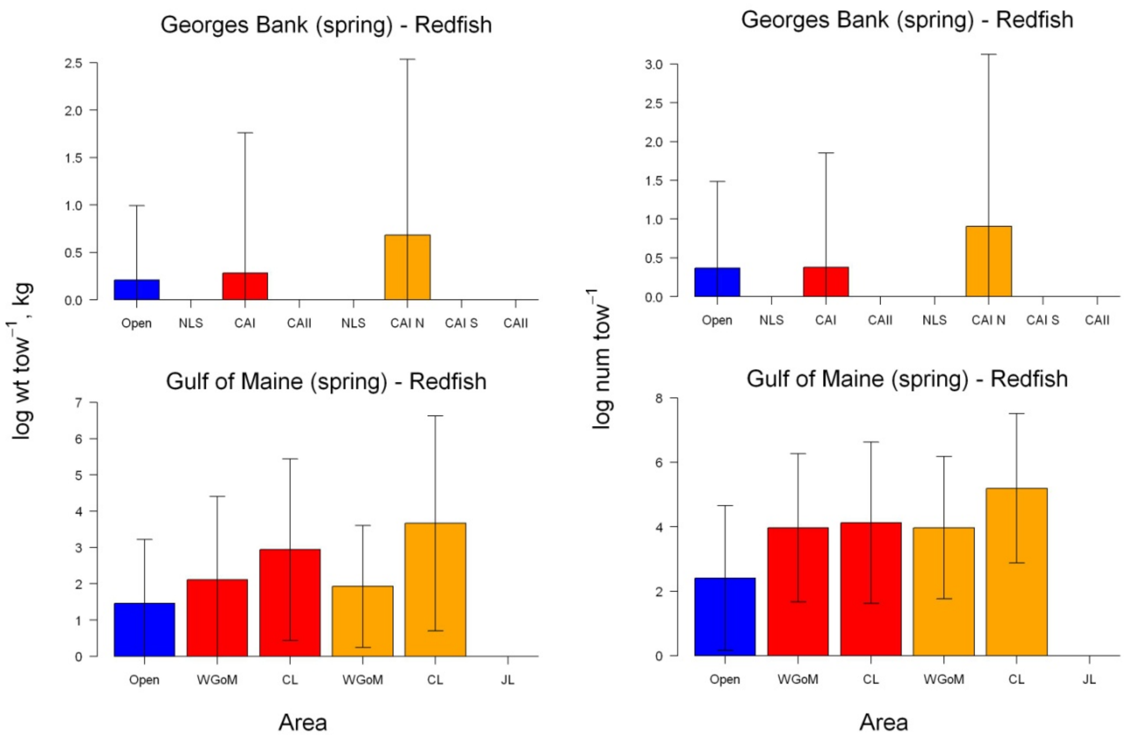

Georges Bank (spring) - Red Hake
Gulf of Maine (spring) - Red Hake
log wt tow^{-1}, kg
Open
NLS
CAI
CAII
CAI N
CAI S
WGoM
CL
JL
Area
Georges Bank (spring) - Red Hake
Gulf of Maine (spring) - Red Hake
log num tow^{-1}
Area

Mean Biomass CPUE Index 2005-2011

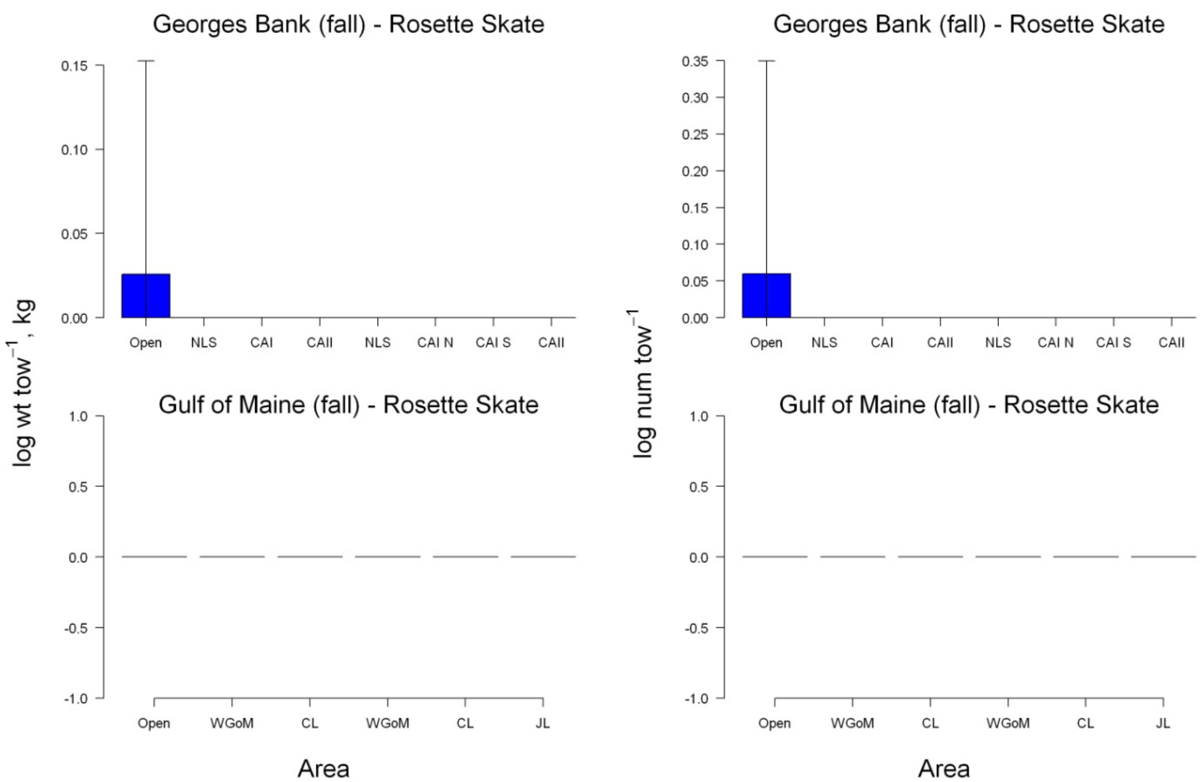


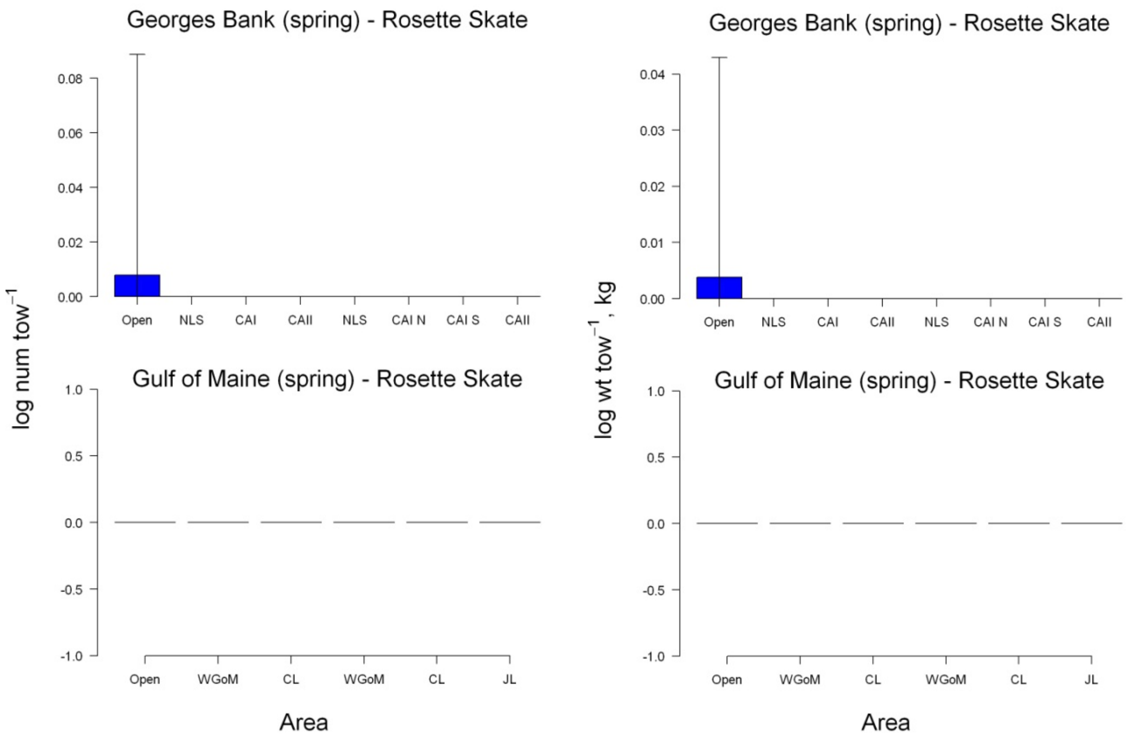
Mean Abundance CPUE Index 2005-2011



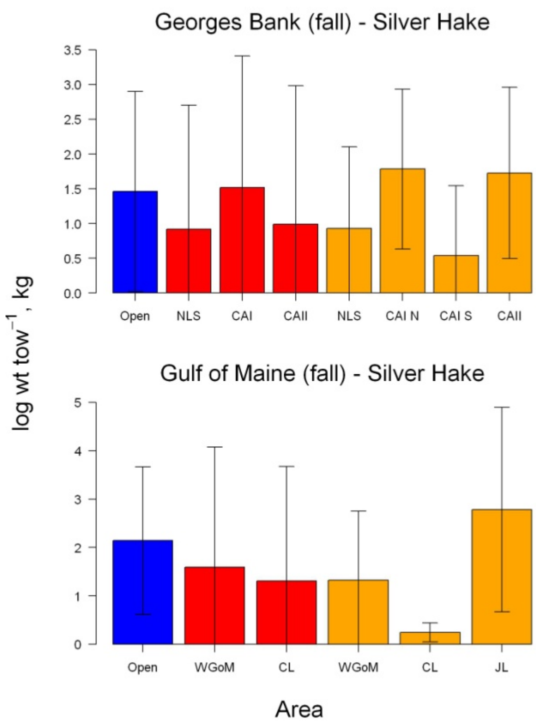

Georges Bank (spring) - Redfish
2.5
2.0
1.5
1.0
0.5
0.0
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log wt tow^{-1}, kg
Gulf of Maine (spring) - Redfish
7
6
5
4
3
2
1
0
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Redfish
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log num tow^{-1}
Gulf of Maine (spring) - Redfish
8
6
4
2
0
Open
WGoM
CL
WGoM
CL
JL
Area

Mean Biomass CPUE Index 2005-2011 Mean Abundance CPUE Index 2005-2011

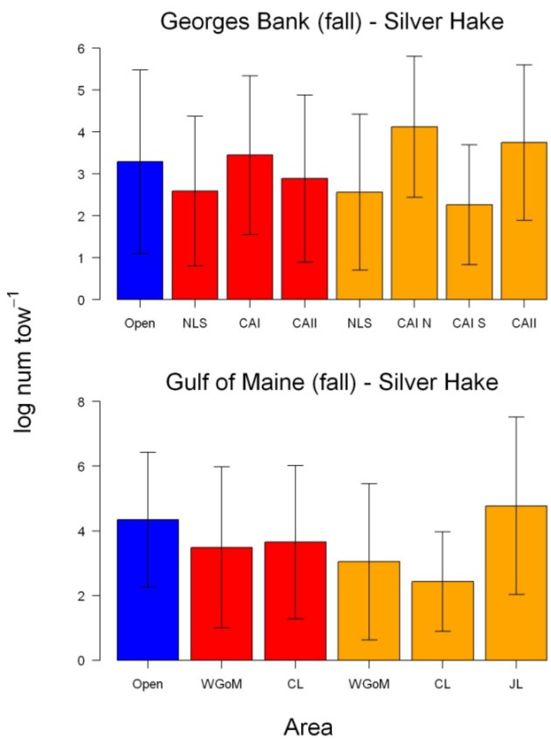


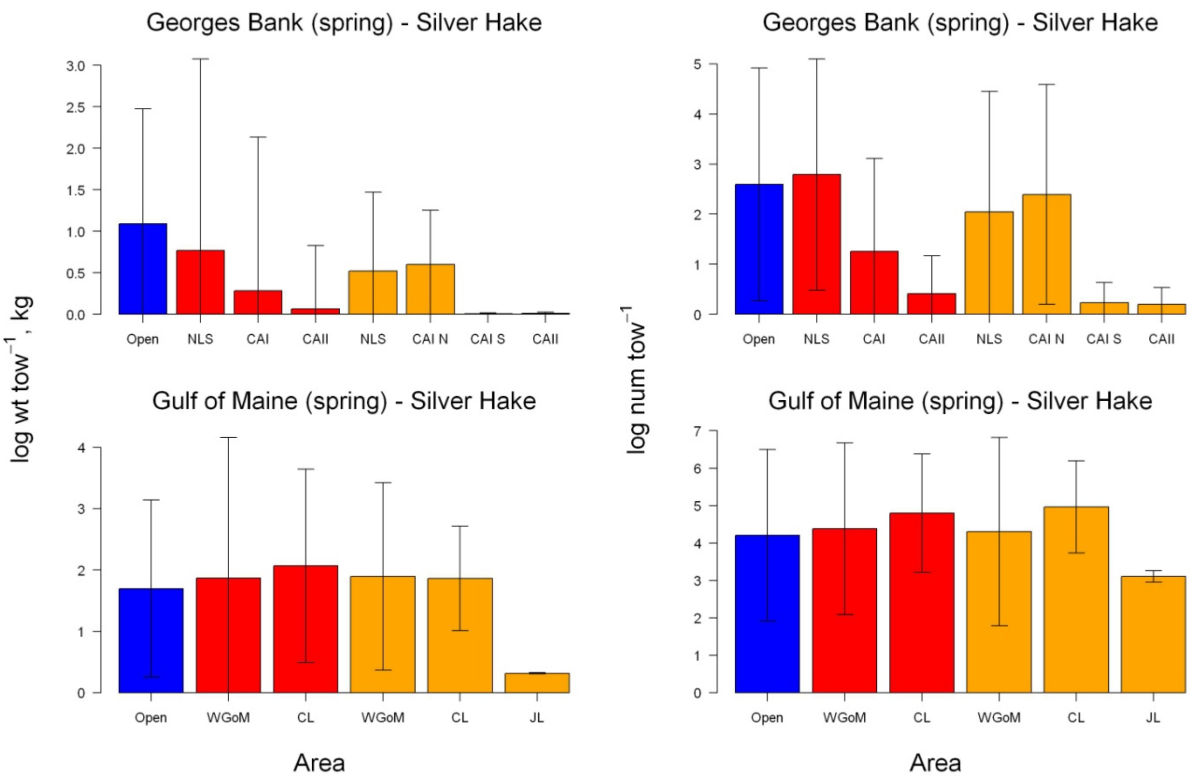

Georges Bank (spring) - Rosette Skate
0.08
0.06
0.04
0.02
0.00
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log num tow^{-1}
Gulf of Maine (spring) - Rosette Skate
1.0
0.5
0.0
-0.5
-1.0
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Rosette Skate
0.04
0.03
0.02
0.01
0.00
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
log wt tow^{-1}, kg
Gulf of Maine (spring) - Rosette Skate
1.0
0.5
0.0
-0.5
-1.0
Open
WGoM
CL
WGoM
CL
JL
Area

Mean Biomass CPUE Index 2005-2011

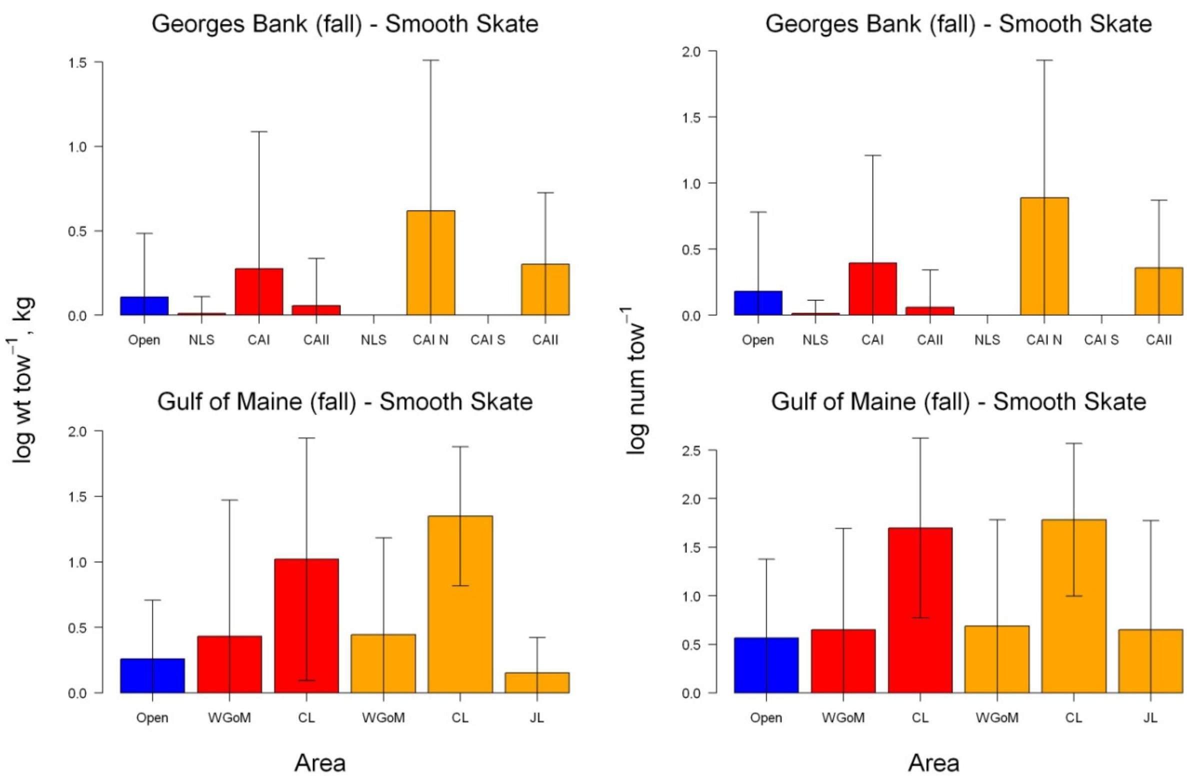


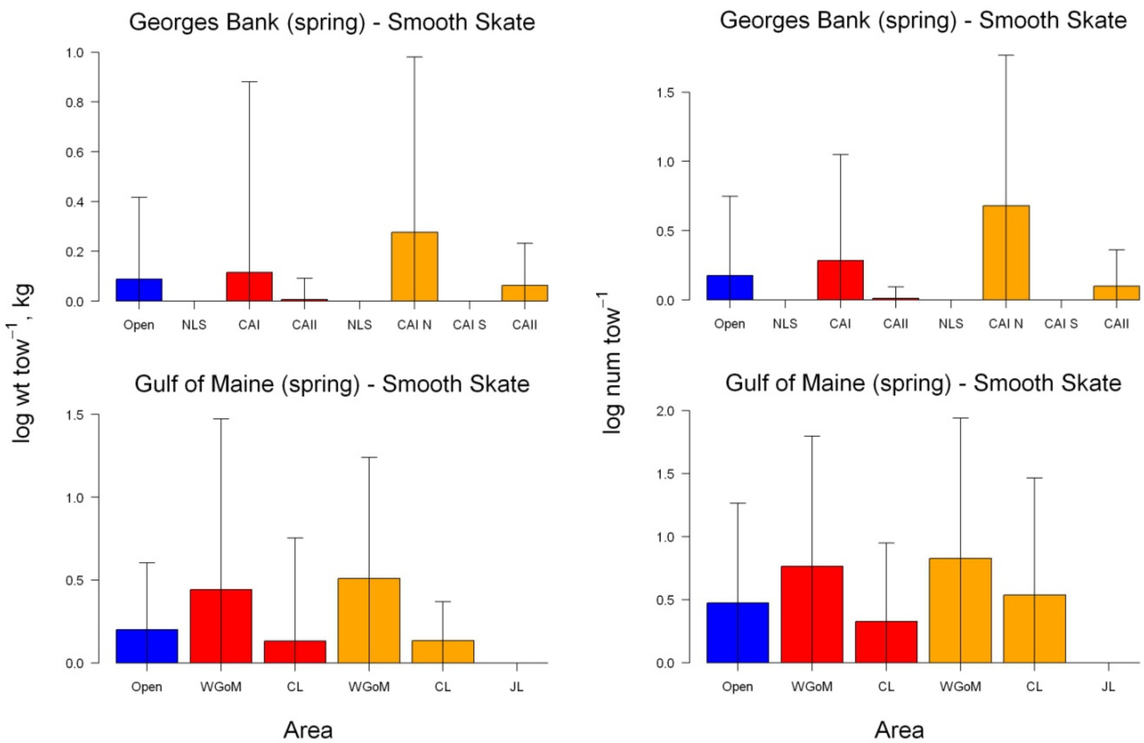
Mean Abundance CPUE Index 2005-2011



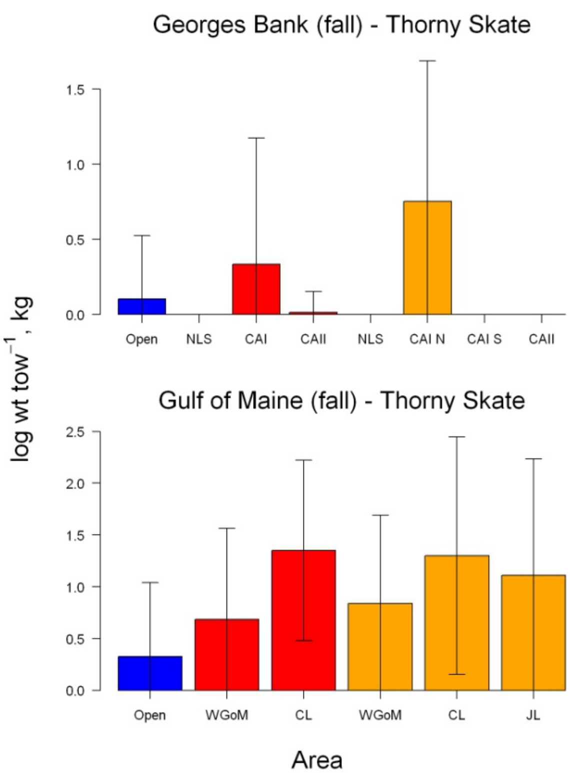

Georges Bank (spring) - Silver Hake
Georges Bank (spring) - Silver Hake
Gulf of Maine (spring) - Silver Hake
Gulf of Maine (spring) - Silver Hake
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
Open
WGoM
CL
WGoM
CL
JL
Area
Area

Mean Biomass CPUE Index 2005-2011 Mean Abundance CPUE Index 2005-2011

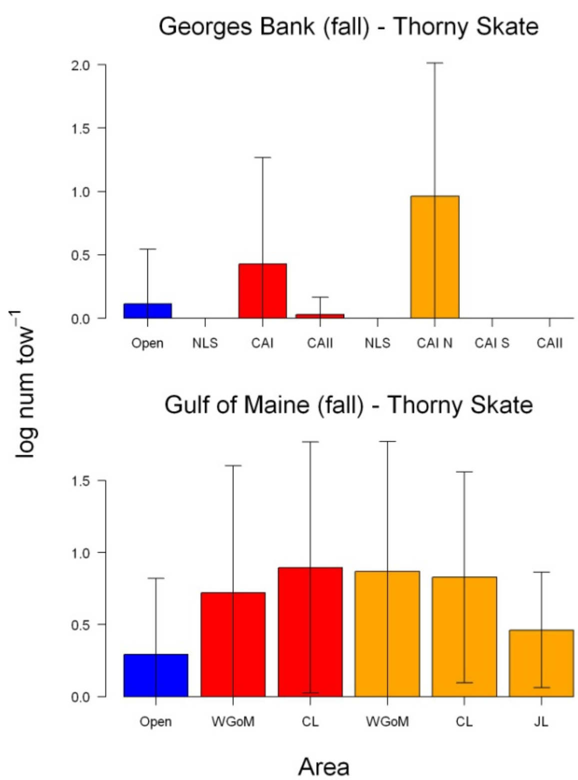


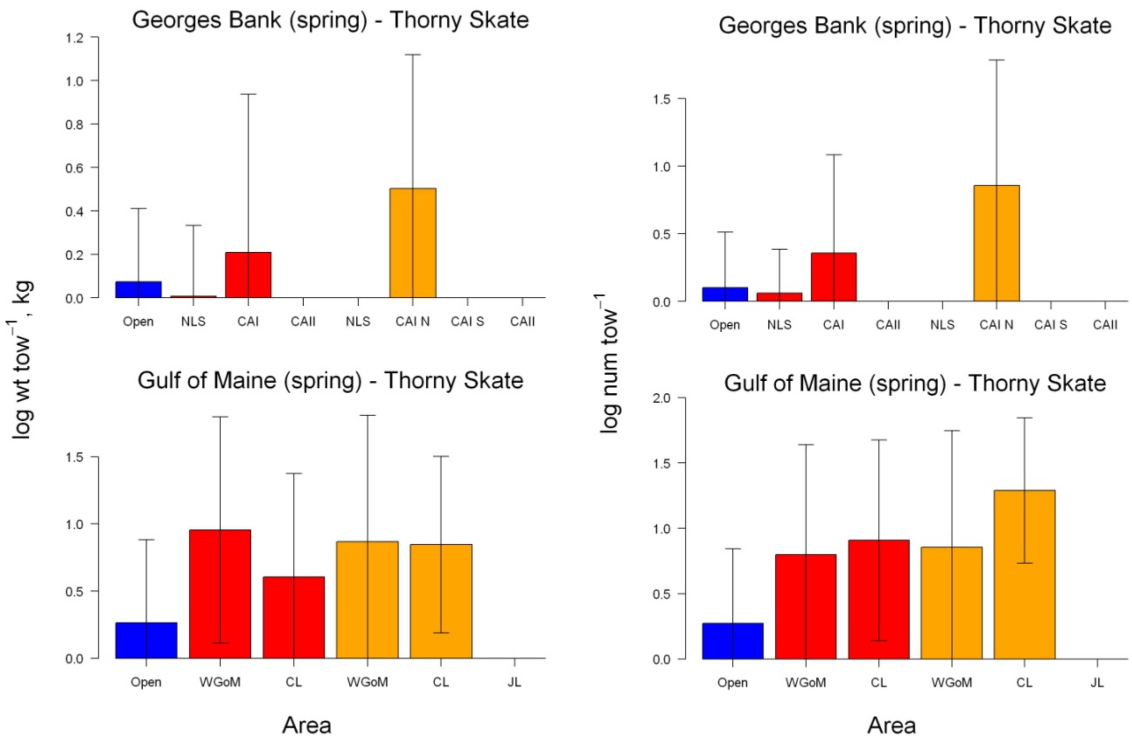

Georges Bank (spring) - Smooth Skate
Georges Bank (spring) - Smooth Skate
log wt tow^{-1}, kg
log num tow^{-1}
Open NLS CAI CAII NLS CAI N CAI S CAII
Gulf of Maine (spring) - Smooth Skate
Gulf of Maine (spring) - Smooth Skate
Open WGoM CL WGoM CL JL
Area
Area

Mean Biomass CPUE Index 2005-2011

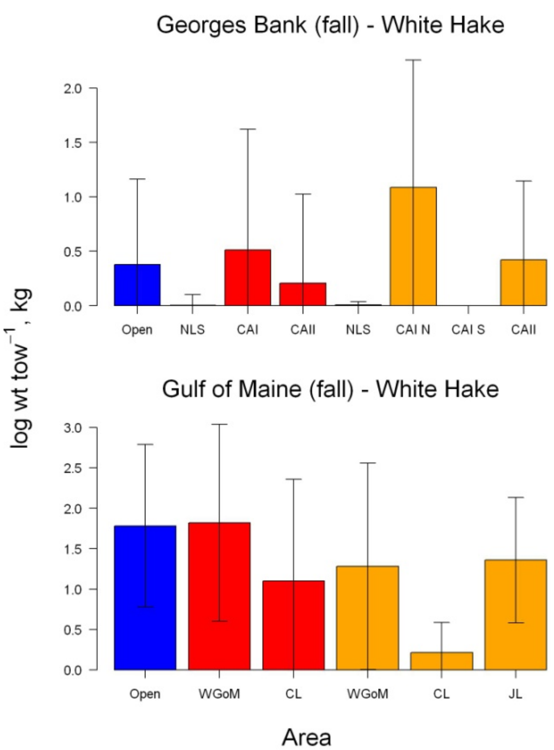


Mean Abundance CPUE Index 2005-2011

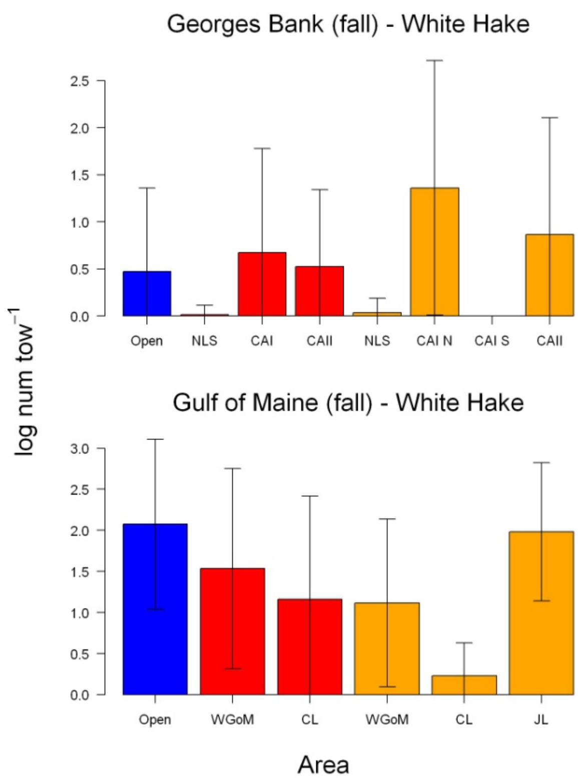


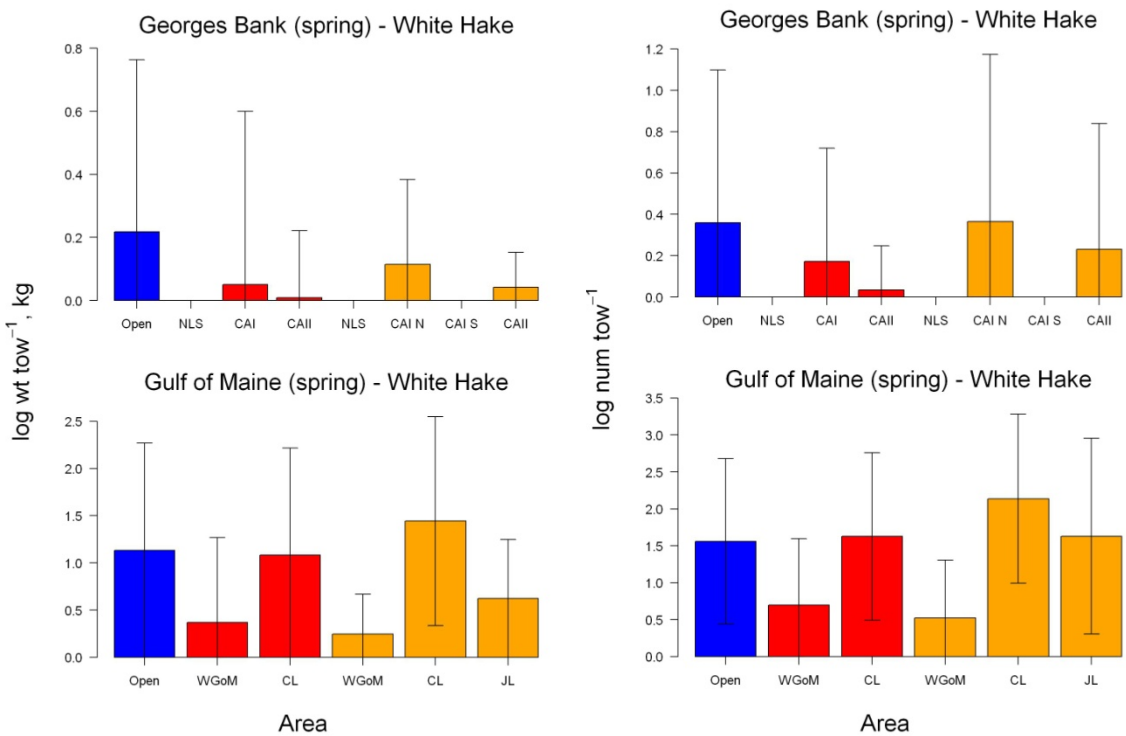

Georges Bank (spring) - Thorny Skate
Gulf of Maine (spring) - Thorny Skate
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
CAI N
CAI S
WGoM
CL
JL
Area

Mean Biomass CPUE Index 2005-2011

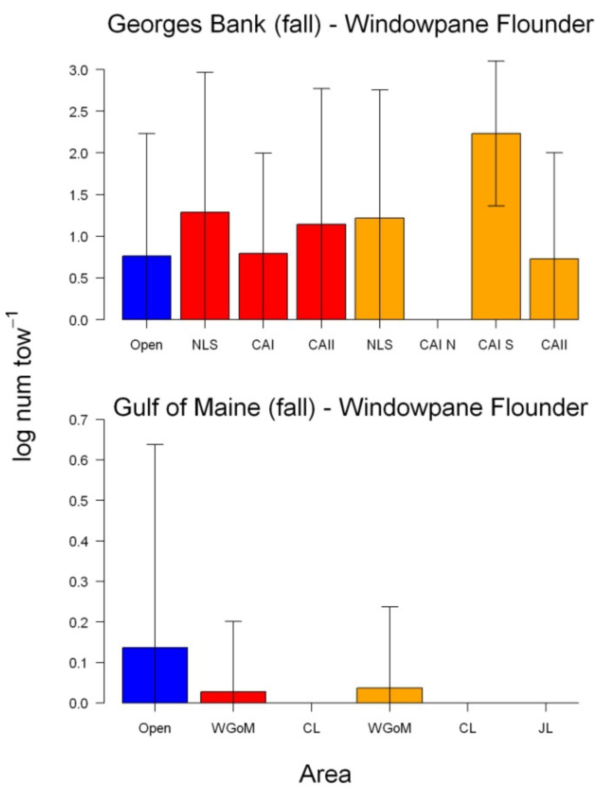


Mean Abundance CPUE Index 2005-2011

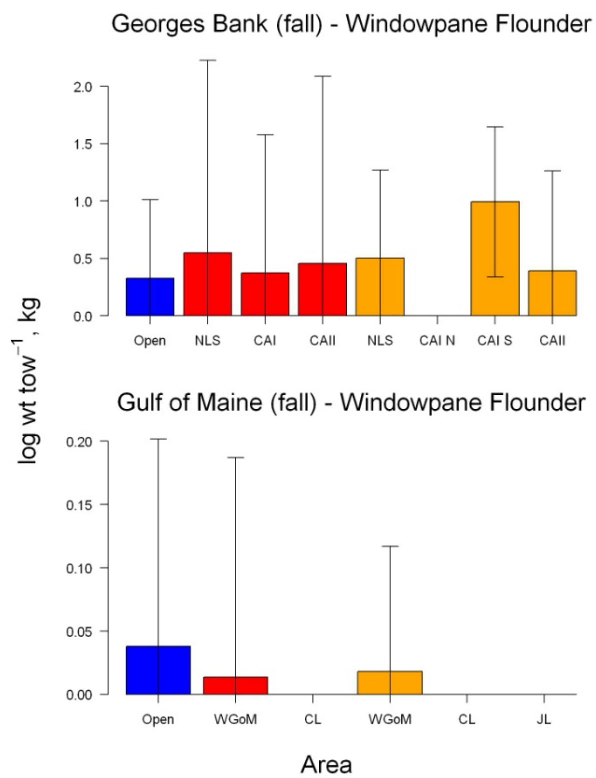


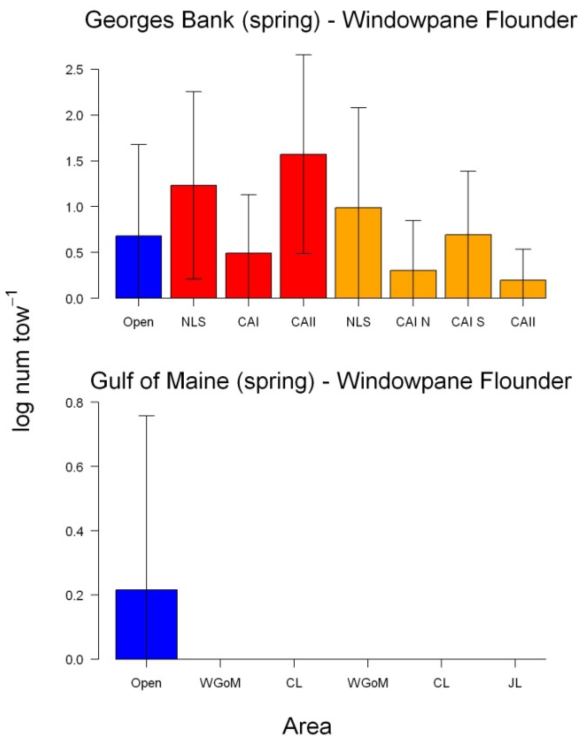

Georges Bank (spring) - White Hake
Gulf of Maine (spring) - White Hake
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
CAI N
CAI S
WGoM
CL
JL
Area

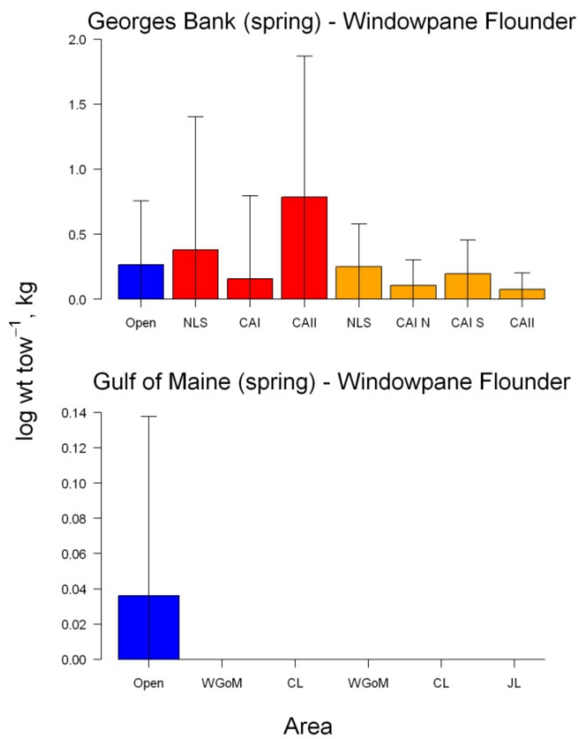
Mean Biomass CPUE Index 2005-2011



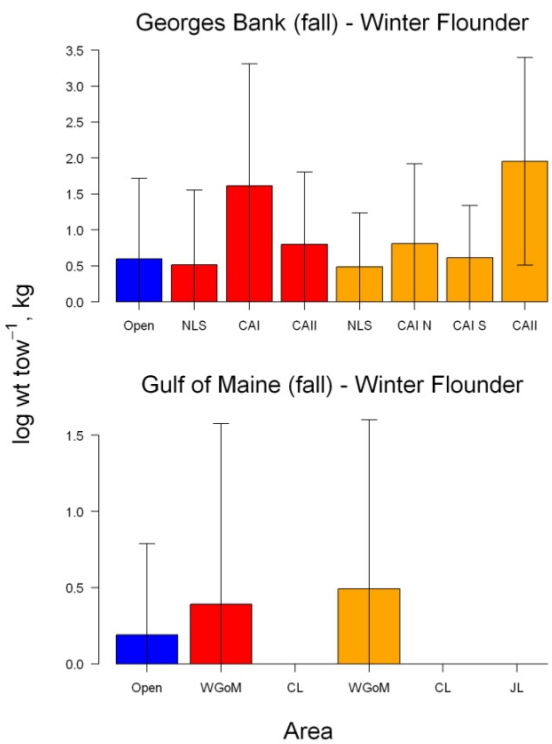
Mean Abundance CPUE Index 2005-2011



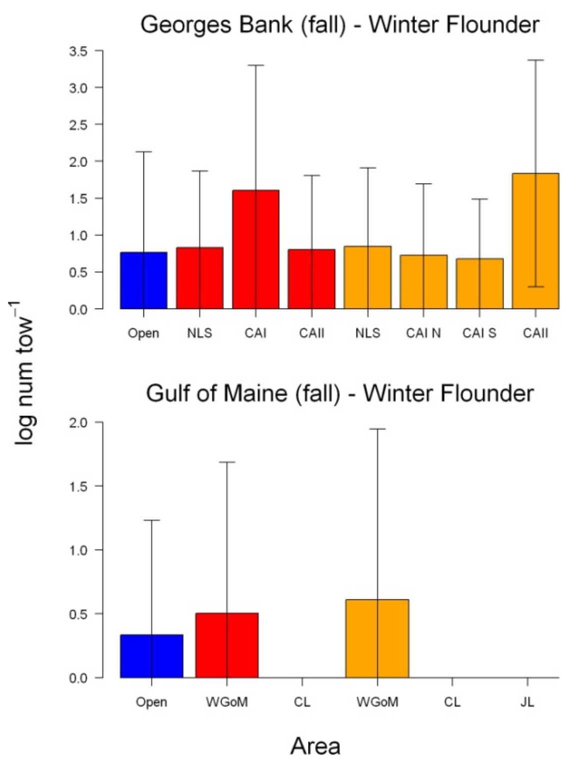

Georges Bank (spring) - Windowpane Flounder
Gulf of Maine (spring) - Windowpane Flounder
log num tow^{-1}
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
WGoM
CL
WGoM
CL
JL
Area

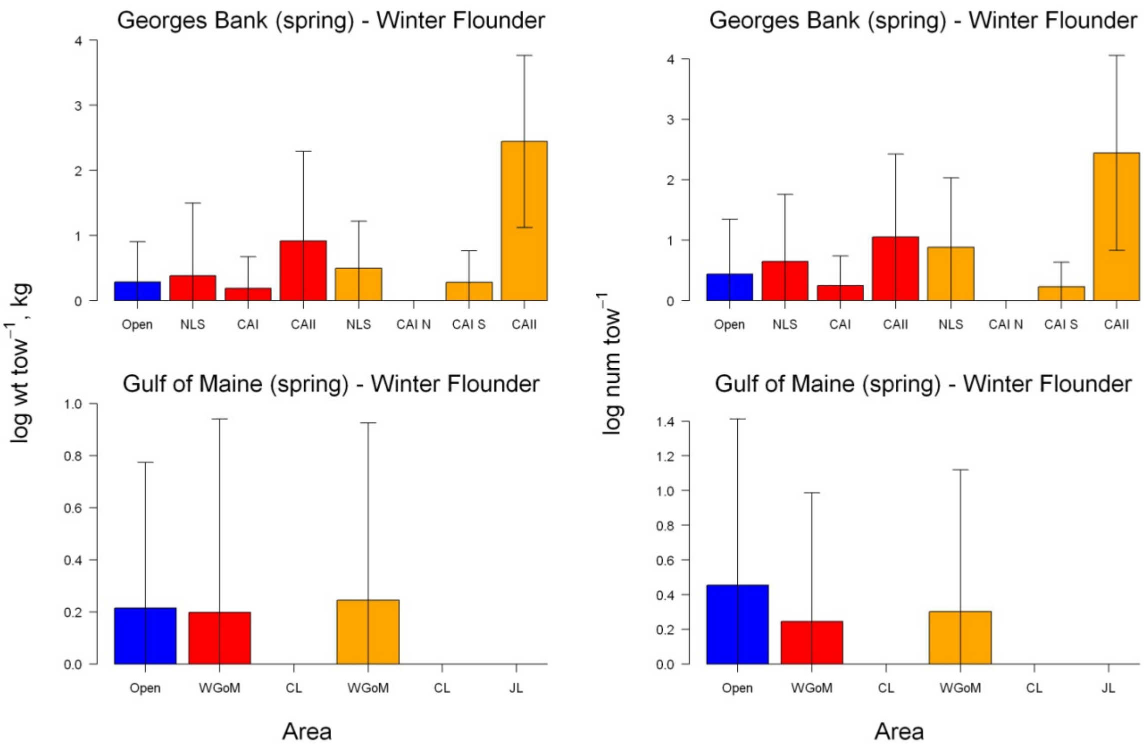

Georges Bank (spring) - Windowpane Flounder
Gulf of Maine (spring) - Windowpane Flounder
log wt tow^{-1}, kg
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
WGoM
CL
WGoM
CL
JL
Area

Mean Biomass CPUE Index 2005-2011



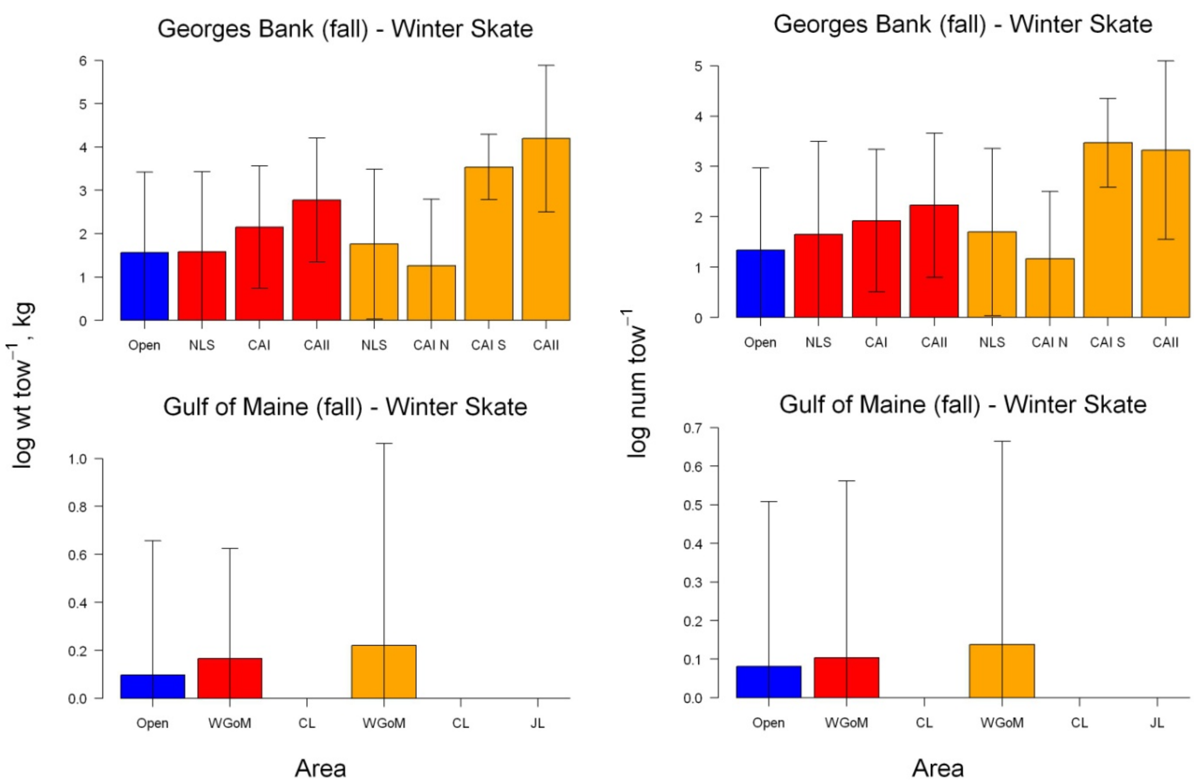
Mean Abundance CPUE Index 2005-2011

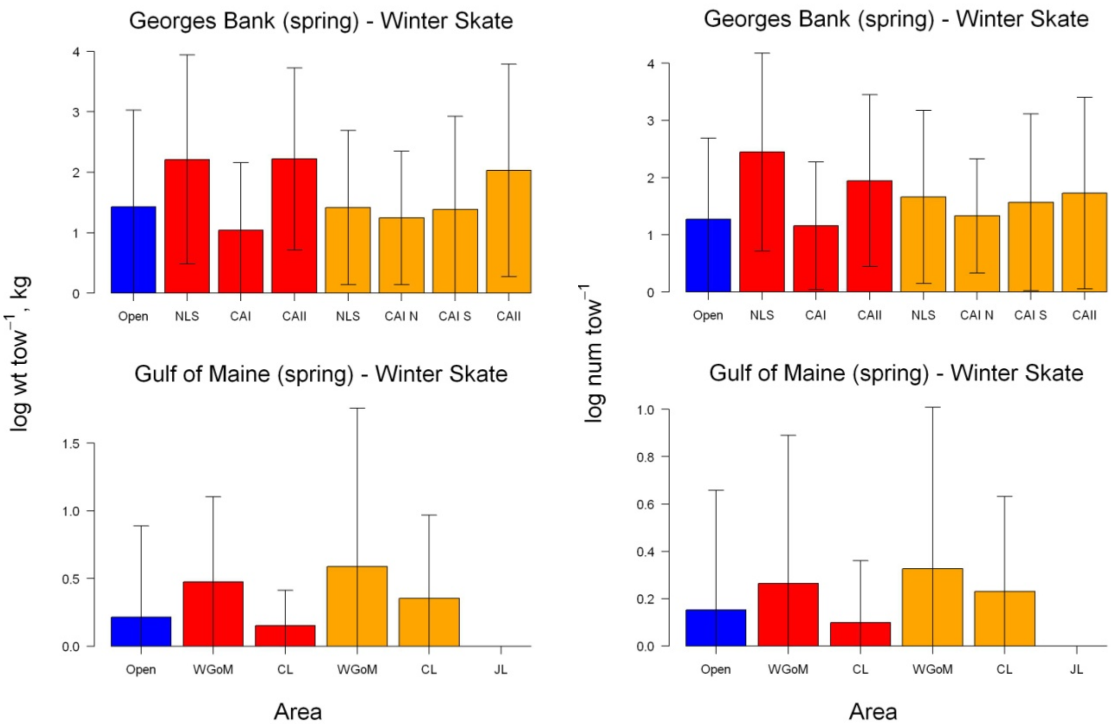



Georges Bank (spring) - Winter Flounder
Georges Bank (spring) - Winter Flounder
Gulf of Maine (spring) - Winter Flounder
Gulf of Maine (spring) - Winter Flounder
log wt tow^{-1}, kg
log num tow^{-1}
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
Open
WGoM
CL
WGoM
CL
JL
Area
Area

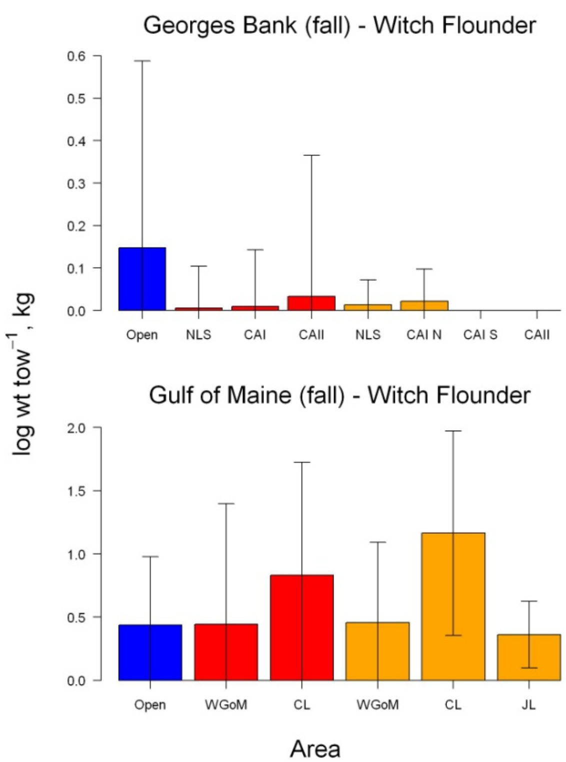
Mean Biomass CPUE Index 2005-2011

Mean Abundance CPUE Index 2005-2011

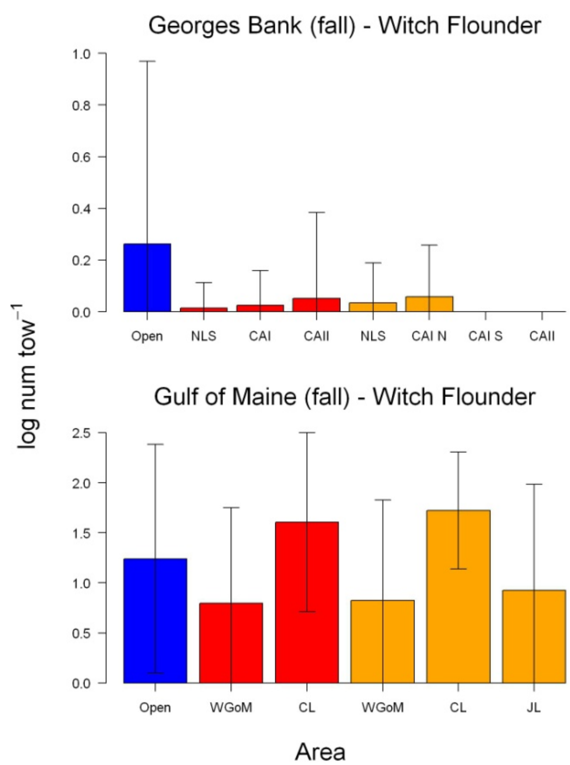



Georges Bank (spring) - Winter Skate
log wt tow^{-1}, kg
Open
NLS
CAI
CAII
NLS
CAI N
CAI S
CAII
Gulf of Maine (spring) - Winter Skate
Open
WGoM
CL
WGoM
CL
JL
Area
Georges Bank (spring) - Winter Skate
log num tow^{-1}
Gulf of Maine (spring) - Winter Skate
Area

Mean Biomass CPUE Index 2005-2011

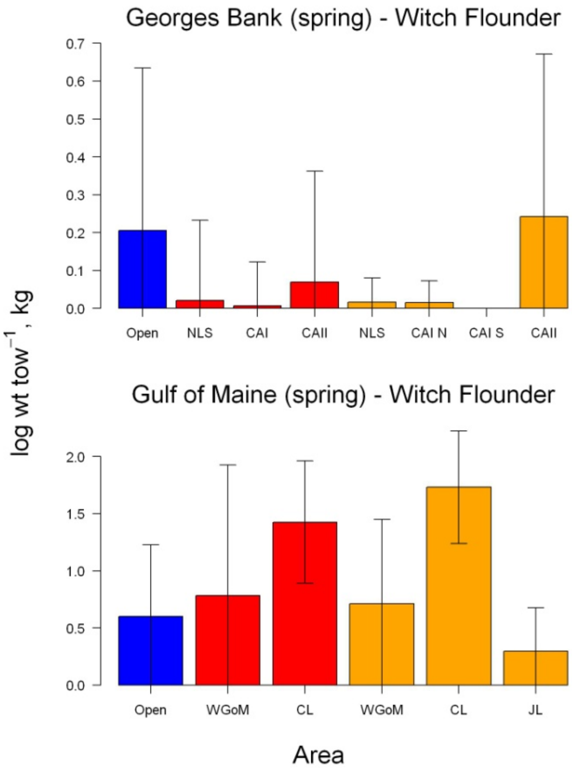


Mean Abundance CPUE Index 2005-2011

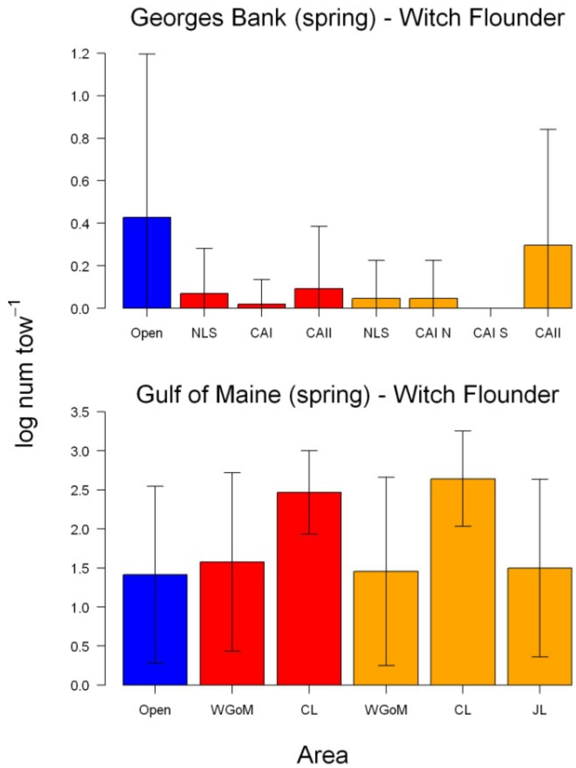


Mean Biomass CPUE Index 2005-2011

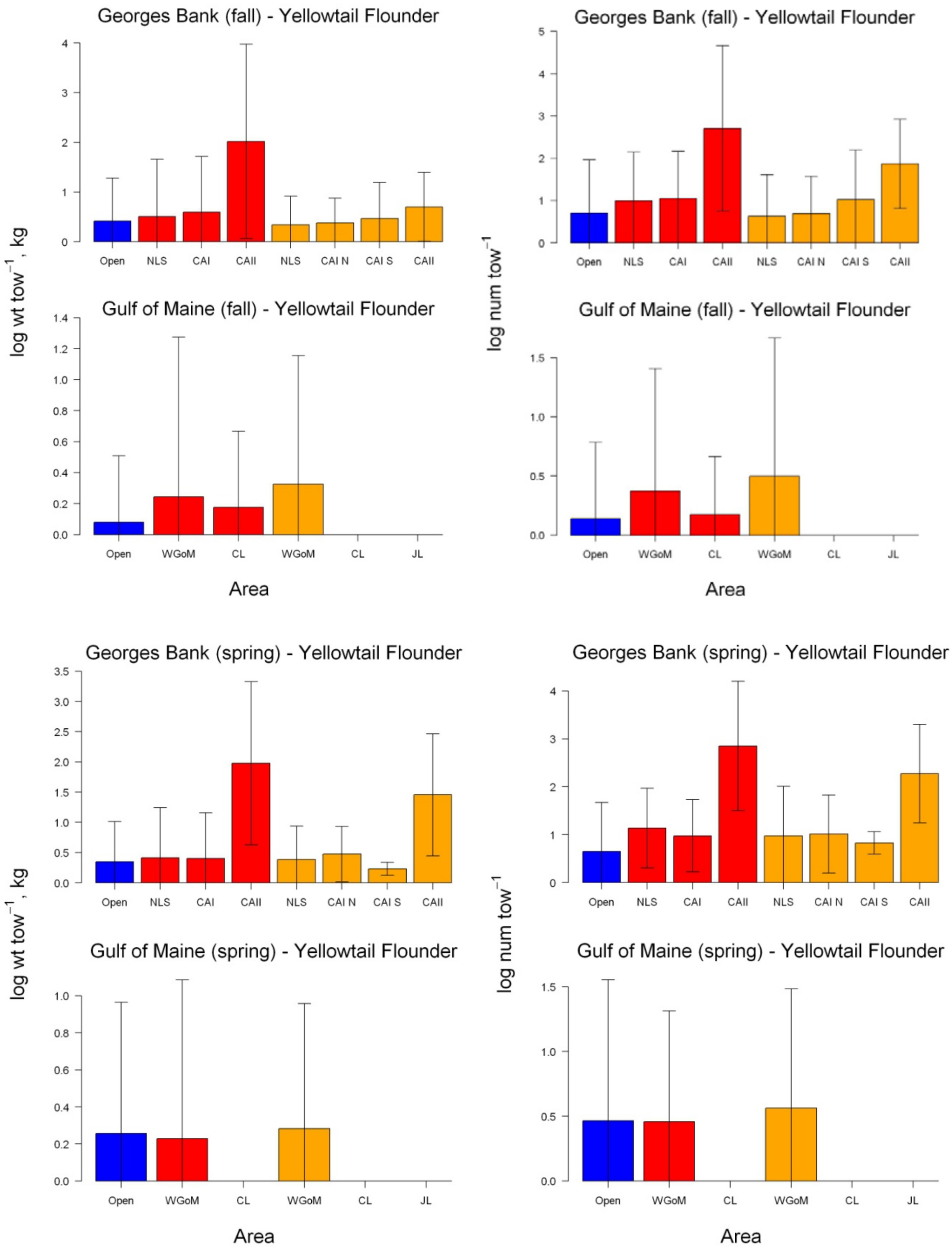
Mean Abundance CPUE Index 2005-2011



Mean Biomass CPUE Index 2005-2011



Mean Abundance CPUE Index 2005-2011



The total biomass (kg) and abundance estimates were generally larger in open areas than closed areas and habitat areas (see tables below):

Table 63 - Total Biomass (kg) from NEFSC Spring Surveys 2005-2011

Area	Barndoor Skate	Winter Skate	Clearnose Skate	Rosette Skate	Little Skate	Smooth Skate	Thorny Skate
GB Open	1264536	6575967	0	7830	4113176	190202	157502
GoM Open	147693	505700	0	0	164603	469037	638600
Cashes Ledge	0	5874	0	0	0	5082	29806
Closed Area I	1254	187747	0	0	621648	12517	23956
Closed Area II	32862	1464494	0	0	906619	1190	0
Nantucket Lightship	81095	1322144	0	0	2989657	0	1171
WGoM	0	48212	0	0	3303	43904	126039
CAI Hab N	1493	124653	0	0	262777	16057	33041
CAI Hab S	0	45300	0	0	125793	0	0
CAII Hab	4494	110661	0	0	96719	1096	0
Cashes Hab	0	4919	0	0	0	1671	15348
Jeffreys Bank	0	0	0	0	0	0	0
NLCA Hab	22272	275495	0	0	982506	0	0
WGoM Hab	0	47382	0	0	3071	39354	81703

Area	Atlantic Cod	Haddock	Pollock	Redfish	Ocean Pout	Monkfish
GB Open	1253399	1838957	80400	482235	833206	919245
GoM Open	1799488	971486	2186771	6947113	302961	2508215
Cashes Ledge	34805	36227	38670	640244	0	148768
Closed Area I	54423	214469	0	33696	18564	0
Closed Area II	1139096	7087153	10343	0	97457	8720
Nantucket Lightship	8249	19760	0	0	20403	3736
WGoM	1069684	179636	210302	571416	35153	101850
CAI Hab N	44115	320373	0	49304	18684	0
CAI Hab S	0	0	0	0	984	0
CAII Hab	438823	1904557	1434	0	30908	2157
Cashes Hab	5917	24012	16991	438841	0	62111
Jeffreys Bank	0	0	0	0	0	0
NLCA Hab	2572	10442	0	0	8862	1556
WGoM Hab	1125263	181395	88390	347700	32578	56494

Total Biomass (kg) from NEFSC Spring Surveys 2005-2011 (contimued)

Area	Offshore Hake	Silver Hake	White Hake	Red Hake
GB Open	44485	4087929	503061	2972921
GoM Open	0	9392188	4448093	4230947
Cashes Ledge	0	246633	69746	155850
Closed Area I	0	33540	5318	33424
Closed Area II	0	12380	1528	4623
Nantucket Lightship	0	187315	0	88250
WGoM	0	431712	35013	248398
CAI Hab N	0	41501	6129	35143
CAI Hab S	0	81	0	50
CAII Hab	0	141	713	1687
Cashes Hab	0	62789	37305	116124
Jeffreys Bank	0	4806	11242	5086
NLCA Hab	0	60142	0	5476
WGoM Hab	0	334038	16586	125106

Area	Halibut	Am Plaice	Yellowtail	Winter Fl	Witch	Windowpane
GB Open	30805	514565	856242	682686	471981	625828
GoM Open	263413	4184343	617830	504245	1736058	77411
Cashes Ledge	0	69832	0	0	113022	0
Closed Area I	0	26023	50729	20970	640	17313
Closed Area II	4057	92949	1111600	268672	12740	213072
Nantucket Lightship	0	0	82712	75823	3449	75383
WGoM	844	279905	20287	17374	93575	0
CAI Hab N	0	26065	30649	0	759	5628
CAI Hab S	0	0	3929	4893	0	3266
CAII Hab	4004	6679	54902	175638	4569	1288
Cashes Hab	0	33193	0	0	53646	0
Jeffreys Bank	20683	6624	0	0	4517	0
NLCA Hab	0	0	41236	56663	1464	25095
WGoM Hab	781	196246	19295	16463	61229	0

Figure 99 - Total Abundance from NEFSC Spring Surveys 2005-2011

Area	Barndoor Skate	Winter Skate	Clearnose Skate	Rosette Skate	Little Skate	Smooth Skate	Thorny Skate
GB Open	1264536	6575967	0	7830	4113176	190202	157502
GoM Open	147693	505700	0	0	164603	469037	638600
Cashes Ledge	0	5874	0	0	0	5082	29806
Closed Area I	1254	187747	0	0	621648	12517	23956
Closed Area II	32862	1464494	0	0	906619	1190	0
Nantucket Lightship	81095	1322144	0	0	2989657	0	1171
WGoM	0	48212	0	0	3303	43904	126039
CAI Hab N	1493	124653	0	0	262777	16057	33041
CAI Hab S	0	45300	0	0	125793	0	0
CAII Hab	4494	110661	0	0	96719	1096	0
Cashes Hab	0	4919	0	0	0	1671	15348
Jeffreys Bank	0	0	0	0	0	0	0
NLCA Hab	22272	275495	0	0	982506	0	0
WGoM Hab	0	47382	0	0	3071	39354	81703

Area	Offshore Hake	Silver Hake	Atlantic Cod	Haddock	Pollock	White Hake
GB Open	44485	4087929	1253399	1838957	80400	503061
GoM Open	0	9392188	1799488	971486	2186771	4448093
Cashes Ledge	0	246633	34805	36227	38670	69746
Closed Area I	0	33540	54423	214469	0	5318
Closed Area II	0	12380	1139096	7087153	10343	1528
Nantucket Lightship	0	187315	8249	19760	0	0
WGoM	0	431712	1069684	179636	210302	35013
CAI Hab N	0	41501	44115	320373	0	6129
CAI Hab S	0	81	0	0	0	0
CAII Hab	0	141	438823	1904557	1434	713
Cashes Hab	0	62789	5917	24012	16991	37305
Jeffreys Bank	0	4806	0	0	0	11242
NLCA Hab	0	60142	2572	10442	0	0
WGoM Hab	0	334038	1125263	181395	88390	16586

Area	Red Hake	Halibut	Am Plaice	Yellowtail
GB Open	2972921	30805	514565	856242
GoM Open	4230947	263413	4184343	617830
Cashes Ledge	155850	0	69832	0
Closed Area I	33424	0	26023	50729
Closed Area II	4623	4057	92949	1111600
Nantucket Lightship	88250	0	0	82712
WGoM	248398	844	279905	20287
CAI Hab N	35143	0	26065	30649
CAI Hab S	50	0	0	3929
CAII Hab	1687	4004	6679	54902
Cashes Hab	116124	0	33193	0
Jeffreys Bank	5086	20683	6624	0
NLCA Hab	5476	0	0	41236
WGoM Hab	125106	781	196246	19295

Area	Winter Fl	Witch	Windowpane	Redfish	Ocean Pout	Monkfish
GB Open	682686	471981	625828	482235	833206	919245
GoM Open	504245	1736058	77411	6947113	302961	2508215
Cashes Ledge	0	113022	0	640244	0	148768
Closed Area I	20970	640	17313	33696	18564	0
Closed Area II	268672	12740	213072	0	97457	8720
Nantucket Lightship	75823	3449	75383	0	20403	3736
WGoM	17374	93575	0	571416	35153	101850
CAI Hab N	0	759	5628	49304	18684	0
CAI Hab S	4893	0	3266	0	984	0
CAII Hab	175638	4569	1288	0	30908	2157
Cashes Hab	0	53646	0	438841	0	62111
Jeffreys Bank	0	4517	0	0	0	0
NLCA Hab	56663	1464	25095	0	8862	1556
WGoM Hab	16463	61229	0	347700	32578	56494

Figure 100 - Total Biomass (kg) from NEFSC Fall Surveys 2005-2011

Area	Barndoor Skate	Winter Skate	Clearnose Skate	Rosette Skate	Little Skate	Smooth Skate	Thorny Skate
GB Open	1847480	7799893	0	54166	6357270	231672	223635
GoM Open	502433	216867	0	0	175206	626185	815854
Cashes Ledge	22689	0	0	0	0	63353	102250
Closed Area I	388807	777641	0	0	604176	32447	40741
Closed Area II	323900	2692694	0	0	758928	10222	2611
Nantucket Lightship	153048	629144	0	0	1213434	1692	0
WGoM	23824	14235	0	0	7918	42467	77386
CAI Hab N	171540	127412	0	0	62721	43183	56624
CAI Hab S	43284	507640	0	0	567470	0	0
CAII Hab	178373	1090022	0	0	81162	5871	0
Cashes Hab	0	0	0	0	0	32950	30808
Jeffreys Bank	0	0	0	0	0	2171	26427
NLCA Hab	164738	424461	0	0	663364	0	0
WGoM Hab	8458	14647	0	0	5526	33095	77718

Area	Offshore Hake	Silver Hake	Atlantic Cod	Haddock	Pollock	White Hake
GB Open	45601	6845247	931513	1595324	90564	952524
GoM Open	0	15836413	1462173	1951977	828156	10426722
Cashes Ledge	0	96675	123088	59677	83566	71800
Closed Area I	0	364315	84814	454728	20759	68587
Closed Area II	0	302490	37918	555573	649	41175
Nantucket Lightship	0	244571	3734	5706	0	430
WGoM	0	307696	999629	589796	358205	408141
CAI Hab N	0	250068	68963	1396236	25925	99229
CAI Hab S	0	10923	0	313	0	0
CAII Hab	0	77337	74703	922490	908	8735
Cashes Hab	0	3158	61370	84273	4281	2754
Jeffreys Bank	0	197478	10050	4696	16899	37497
NLCA Hab	0	134578	0	960	0	572
WGoM Hab	0	162604	1340093	719882	216866	153579

Area	Red Hake	Halibut	Am Plaice	Yellowtail
GB Open	3841367	11134	542325	1077413
GoM Open	4508296	282999	4643342	174069
Cashes Ledge	73058	2726	41131	6871
Closed Area I	174473	0	41780	84008
Closed Area II	182084	8327	13335	1167504
Nantucket Lightship	72319	0	0	106450
WGoM	226832	1781	227841	21795
CAI Hab N	222316	0	58378	23262
CAI Hab S	506	0	0	9075
CAII Hab	38938	4269	1995	16925
Cashes Hab	8921	2499	20530	0
Jeffreys Bank	36435	8551	12809	0
NLCA Hab	33304	0	0	35524
WGoM Hab	144114	1788	153373	22744

Area	Winter Fl	Witch	Windowpane	Redfish	Ocean Pout	Monkfish
GB Open	1682447	330308	799360	1229058	520123	1391440
GoM Open	439877	1161522	81316	20173671	85957	2783552
Cashes Ledge	0	46366	0	845938	1499	106067
Closed Area I	413479	1002	46193	74641	14170	83205
Closed Area II	219370	5956	103667	4568	28161	64797
Nantucket Lightship	110056	874	119231	0	12622	63726
WGoM	37937	43961	1077	974450	14579	107885
CAI Hab N	63224	1115	0	122194	11683	62276
CAI Hab S	12935	0	25831	0	830	30
CAII Hab	101090	0	7971	0	12630	11491
Cashes Hab	0	25429	0	195993	1336	18361
Jeffreys Bank	0	5647	0	112589	2595	14355
NLCA Hab	55565	1165	57376	0	7115	39759
WGoM Hab	37622	34402	1079	384287	14853	71965

Figure 101 - Total Abundance from NEFSC Fall Surveys 2005-2011

Area	Barndoor Skate	Winter Skate	Clearnose Skate	Rosette Skate	Little Skate	Smooth Skate	Thorny Skate
GB Open	1847480	7799893	0	54166	6357270	231672	223635
GoM Open	502433	216867	0	0	175206	626185	815854
Cashes Ledge	22689	0	0	0	0	63353	102250
Closed Area I	388807	777641	0	0	604176	32447	40741
Closed Area II	323900	2692694	0	0	758928	10222	2611
Nantucket Lightship	153048	629144	0	0	1213434	1692	0
WGoM	23824	14235	0	0	7918	42467	77386
CAI Hab N	171540	127412	0	0	62721	43183	56624
CAI Hab S	43284	507640	0	0	567470	0	0
CAII Hab	178373	1090022	0	0	81162	5871	0
Cashes Hab	0	0	0	0	0	32950	30808
Jeffreys Bank	0	0	0	0	0	2171	26427
NLCA Hab	164738	424461	0	0	663364	0	0
WGoM Hab	8458	14647	0	0	5526	33095	77718

Area	Offshore Hake	Silver Hake	Atlantic Cod	Haddock	Pollock	White Hake
GB Open	45601	6845247	931513	1595324	90564	952524
GoM Open	0	15836413	1462173	1951977	828156	10426722
Cashes Ledge	0	96675	123088	59677	83566	71800
Closed Area I	0	364315	84814	454728	20759	68587
Closed Area II	0	302490	37918	555573	649	41175
Nantucket Lightship	0	244571	3734	5706	0	430
WGoM	0	307696	999629	589796	358205	408141
CAI Hab N	0	250068	68963	1396236	25925	99229
CAI Hab S	0	10923	0	313	0	0
CAII Hab	0	77337	74703	922490	908	8735
Cashes Hab	0	3158	61370	84273	4281	2754
Jeffreys Bank	0	197478	10050	4696	16899	37497
NLCA Hab	0	134578	0	960	0	572
WGoM Hab	0	162604	1340093	719882	216866	153579

Area	Red Hake	Halibut	Am Plaice	Yellowtail
GB Open	3841367	11134	542325	1077413
GoM Open	4508296	282999	4643342	174069
Cashes Ledge	73058	2726	41131	6871
Closed Area I	174473	0	41780	84008
Closed Area II	182084	8327	13335	1167504
Nantucket Lightship	72319	0	0	106450
WGoM	226832	1781	227841	21795
CAI Hab N	222316	0	58378	23262
CAI Hab S	506	0	0	9075
CAII Hab	38938	4269	1995	16925
Cashes Hab	8921	2499	20530	0
Jeffreys Bank	36435	8551	12809	0
NLCA Hab	33304	0	0	35524
WGoM Hab	144114	1788	153373	22744

Area	Winter Fl	Witch	Windowpane	Redfish	Ocean Pout	Monkfish
GB Open	1682447	330308	799360	1229058	520123	1391440
GoM Open	439877	1161522	81316	20173671	85957	2783552
Cashes Ledge	0	46366	0	845938	1499	106067
Closed Area I	413479	1002	46193	74641	14170	83205
Closed Area II	219370	5956	103667	4568	28161	64797
Nantucket Lightship	110056	874	119231	0	12622	63726
WGoM	37937	43961	1077	974450	14579	107885
CAI Hab N	63224	1115	0	122194	11683	62276
CAI Hab S	12935	0	25831	0	830	30
CAII Hab	101090	0	7971	0	12630	11491
Cashes Hab	0	25429	0	195993	1336	18361
Jeffreys Bank	0	5647	0	112589	2595	14355
NLCA Hab	55565	1165	57376	0	7115	39759
WGoM Hab	37622	34402	1079	384287	14853	71965

6.6.3 Sector rules, permits, and fishing activity

6.6.3.1 Fishing rules and regulations for vessels fishing in sector exemption areas.

Although the primary purpose of closed area sector exemptions is to target (sometimes more abundant) groundfish species that occur there, the vessels may also target, partially target, or land as incidental catch other species. The species may include monkfish (tails and livers), skates (for wings), and summer flounder (on the southern part of Georges Bank and in Southern New England). Relatively high valued species such as lobsters and scallops may also add trip value. These species may influence where, when, and how (gear type) vessels fish in the proposed exemption areas.

For targeting and landing groundfish, the standard groundfish fishing rules would apply and would be subject to certain approved exemptions in Sector Operations Plans. Many of these exempted rules were originally intended to augment or support DAS limits, which do not apply to sector vessels. Besides closed area exemption requests, these exemptions may include one or more of the following:

- 120 Day Gillnet Block out of the Fishery
- 20 Day Spawning Block
- Limits on the Number of Gillnets for Day Gillnet Vessels
- Prohibition on a vessel’s hauling another Vessel’s gillnet gear
- Limits on the Number of Gillnets that May be Hauled on GB when fishing on a Groundfish/Monkfish DAS
- Limits on the Number of Hooks that May be Fished
- DAS Leasing Program Length and Horsepower Restrictions
- GOM Sink Gillnet Mesh Exemption January Through April
- Extension of the GOM Haddock Sink Gillnet Program Through May
- Prohibition on Discarding
- Daily catch reporting by Sector Managers for Sector vessels that fish in the CA I Hook Gear Haddock SAP
- Gear Requirements in the US/CA Management Area
- Powering VMS While at the Dock
- DSM Requirements for Vessels Fishing West of 72°30’ W. Long.
- DSM requirements for Handgear A-permitted Sector Vessels
- DSM Requirements for Monkfish Trips in the Monkfish SFMA
- Prohibition on Fishing Inside and Outside the CA I Hook Gear Haddock SAP While on the Same Trip
- 6.5-Inch Minimum Mesh Size Requirement to Allow 6-Inch Mesh for Targeted Redfish Trips
- Prohibition on a Vessel Hauling Another Vessel's Hook Gear
- Requirement to declare intent to fish in the Eastern US/CA SAP and CA II YT/haddock SAP from the dock

In addition, the vessel may keep some or all of the catch based on permits issued to the vessel. Depending on the permit, the following rules might apply:

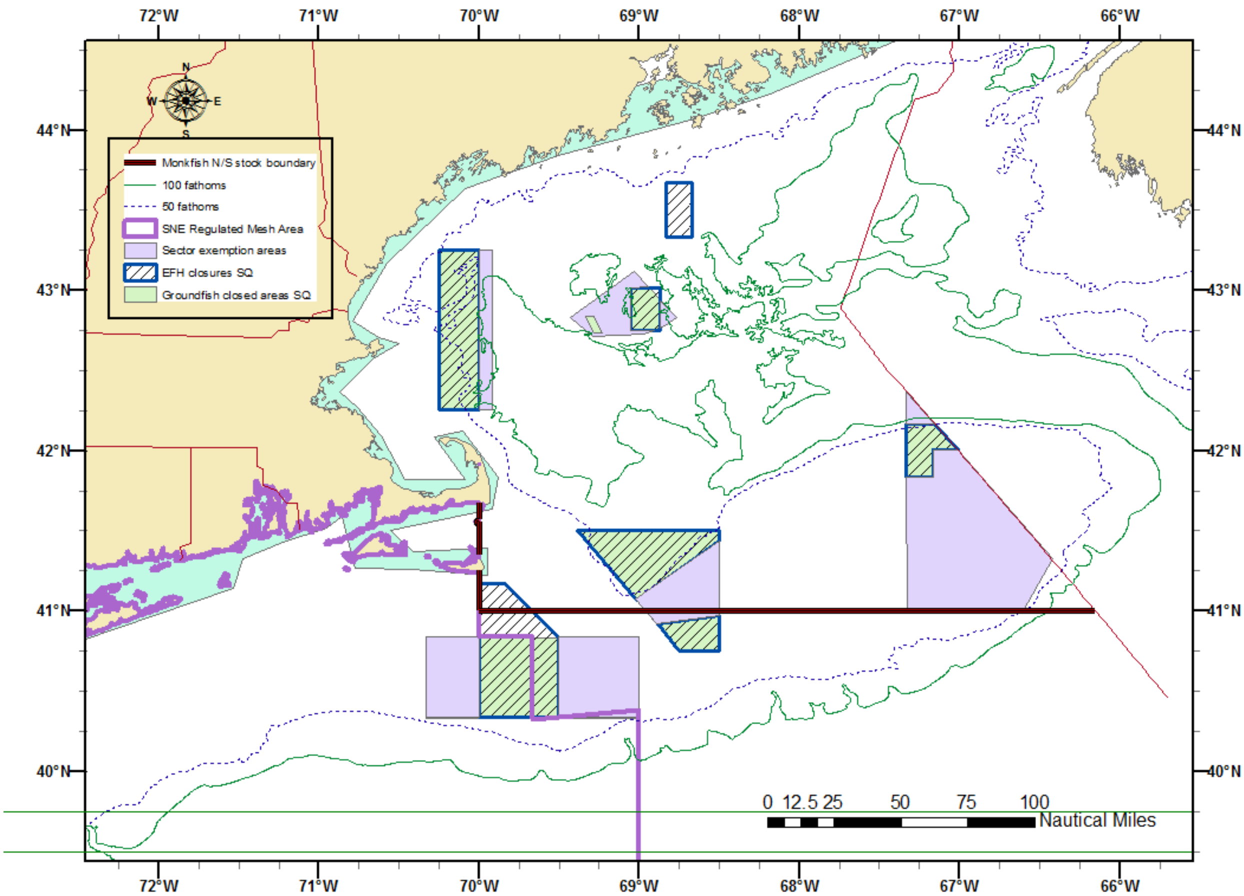
<u>Monkfish</u>

Sector vessels with a limited access Category C or D monkfish permit may land monkfish up to the possession limits specified in the FMP. The possession limit depends on which permit is held, what DAS program is applied to the trip, and where fishing occurs. Most exemption areas are within the Northern Fishery Management Area and some exemption areas in the Southern Fishery Management Area (Figure 103). Sector vessels may instead hold a Category E incidental monkfish permit. In this case and regardless of where fishing occurs, the monkfish possession limit depends on the gear used by the vessel. The current possession limits are shown in the table below.

Figure 102 - Monkfish possession limits that would apply to sector enrolled vessels fishing in exemption areas which depend on permit held by the vessel, DAS category for the trip, and location fished.

Permit	Area Northern Monkfish Management Area (NFMA)	Southern Monkfish Management Area (SFMA)
C (on a Monkfish DAS)	1,250 lb (3,638 lb whole weight)	550 lb (1,601 lb whole weight)
D (on a Monkfish DAS)	600 lb (1,746 lb whole weight)	450 lb (1,310 lb whole weight)
C,D, or E using trawls while on a NE Multispecies DAS	Up to 25% (where all monkfish is converted to tail weight) of the total weight of fish on board, not to exceed 300 lb (873 lb whole weight/DAS)	300 lb (873 lb whole weight)
C, D, or E using other gears while on a NE Multispecies DAS	Up to 25% (where all monkfish is converted to tail weight) of the total weight of fish on board, not to exceed 300 lb (873 lb whole weight/DAS)	50 lb (146 lb whole weight)
	Gulf of Maine or Georges Bank Regulated Mesh Area	Southern New England Regulated Mesh Area
E while not on a NE Multispecies or Monkfish DAS	Up to 5% (where all monkfish is converted to tail weight) of the total weight of fish on board	Up to 5% (where all monkfish is converted to tail weight) of the total weight of fish on board, not to exceed 50 lb (146 lb. whole weight) per day; up to 150 lbs. (434 lb whole weight) per trip

Figure 103 - Relationship of monkfish management areas having different possession limits and proposed sector exemption areas.



<u>Skates</u>

Vessels with an open access skate permit must use a Category A Multispecies DAS to land skates and skate wings. A possession limit is defined in the Skate FMP, currently 4,100 lbs. of skate wings or 20,000 lbs. of whole skates with a Bait Letter of Authorization.

<u>Spiny Dogfish</u>

Generally, when a sector vessel is on a non-DAS sector trip or on a NE Multispecies or Monkfish DAS, it may retain up to 3,000 lbs. of dogfish while using trawl gear with codend mesh larger or equal to 6.5 inches square or diamond; or gillnet gear with mesh equal to or larger than 6.5 inches square or diamond throughout the net.

When not on a sector trip or a DAS, vessels may fish for dogfish using compliant gear in one or more of the following Exemption Areas, listed in the table below.

For more detail, refer to http://www.nero.noaa.gov/nero/regs/infodocs/SectorsDogfishInfoSheet.pdf.

Exemption Areas (EAs) and Fisheries Where Spiny Dogfish Can Be Retained:

Exempted Areas within the GOM/GB RMAs

Trawl	***Gillnet***
Nantucket Shoals Dogfish EA*	Nantucket Shoals Dogfish EA*
Cultivator Shoal Whiting Fishery EA*†	GOM/GB Dogfish Gillnet EA
Small Mesh Areas 1 & 2†	
Raised Footrope Trawl Exempted Whiting Fishing Area*†	

* Requires a Letter of Authorization (LOA) to participate. LOAs can be obtained from the Northeast Regional Permit Office at (978) 281-9370.
† Dogfish is considered an incidentally caught species in these EAs. These EAs require the use of small mesh to target whiting.

Exempted Areas within the SNE RMA

Trawl	***Gillnet***
SNE Exemption Area (includes part of GB RMA)	SNE Dogfish Gillnet EA

Exempted Areas within the MA RMA

Trawl	***Gillnet***
Mid-Atlantic EA (includes part of SNE RMA)	Mid-Atlantic EA (includes part of SNE RMA)

Summer flounder

Vessels that hold a moratorium summer flounder permit may retain and land the catch, subject to minimum size and state-based quotas,when using nets with mesh larger than 5.5 inches.

Vessels without moratorium summer flounder permits may retain the recreational per person bag limit when the recreational season is open for that state of landing.

Scallops – vessels may retain scallops and scallop meats, depending on where fishing occurs, how the area is classified in the Scallop FMP, and what type of scallop permit the vessel holds.

Vessels with no scallop permits may retain no scallops.

Vessels with limited access incidental scallop permits may retain up to 40 lbs. of meats per trip, regardless of area fished.

Vessels with limited access general category ITQ permits may retain up to 600 lbs. per trip, but may possess no scallops if fishing in a scallop closed or access area (portions of Closed Area I, Closed Area II, and the Nantucket Lightship Area are designated as access areas and may not be open to fishing). When an access area is open for scallop fishing, the vessel may retain up to 600 lbs. per trip, must use a scallop dredge, and must be on a declared scallop trip (no groundfish can be landed). The scallops will be counted against their scallop ITQ.

Vessels with scallop limited access (i.e. combination) permits may retain up to the limit specified in the Scallop FMP for areas designated as access areas and open to fishing. These vessels may not use a scallop dredge when fishing in a year round groundfish closed area, unless it is also designated as an open scallop access area, where they may not use trawl gear while on a declared scallop trip. Otherwise vessels may retain no scallops when fishing in an area that is not an open area or open as a scallop access area. Vessels with a limited access scallop permit are required to land all yellowtail flounder.

Lobster

Generally, 100 lobsters per DAS, or a maximum of 500 lobsters per trip may be retained, subject to limits on minimum and maximum size, berried and V-notch females, etc. Fishing in specified exemption programs (like the Gulf of Maine/Georges Bank Monkfish gillnet exemption), vessels are limited to 10% of total weight of fish onboard, or 100 lobsters, whichever is less (http://www.nero.noaa.gov/nero/regs/infodocs/Large_mesh_exemption.pdf).

6.6.3.2 Permits

The following is a summary of the number and type of permits held by sector vessels during the 2011 fishing year. Because the fishing year is still underway, permit data for the 2012 fishing year were incomplete at the time of this report.

Figure 104 - Groundfish permits for 2011 held by vessels enrolled in sectors during the 2012 fishing year.

Category	Abbreviation	Total*
Individual days at sea	A	623
Small vessel exemption	C	1
Hook gear	D	34
Combination	E	27
Large mesh individual days at sea	F	7
Hand gear – limited access	HA	14
Hand gear – open access	HB	5
Scallop possession limit	J	1
Open access	K	6
Unmatched		13

*Excludes CPH & History Retention permit categories (230 obs.) and common pool (475 obs.)

Figure 105 - Federal shellfish permits for 2011 held by vessels enrolled in sectors during the 2012 fishing year.

	Species				
Category	Scallop	Lobster	Quahog	Red Crab	Surf Clam
IFQ	24				
NGOM	14				
Incidental	42				
Limited Access – Full Time	6				
Limited Access – Full/Small Dredge	3				
Limited Access – Part/Small Dredge	1				
General			247		248
Maine Mahogany Quahog			1		
Open Access				165	
Non-Trap		498			

Figure 106 - Federal demersal finfish permits for 2011 held by vessels enrolled in sectors during the 2012 fishing year.

	Species						
Category	Black Seabass	Spiny Dogfish	Summer Flounder	Monkfish	Scup	Skate	Tilefish
Commercial	185	652	311		243		536
Charter/Party	25		26		25		3
Incidental				313			
C				145			
D				213			
Offshore				6			
General						631	

Figure 107 - Federal pelagic finfish permits for 2011 held by vessels enrolled in sectors during the 2012 fishing year.

Category	Species			
	Bluefish	Herring	Squid/Mackerel/Butterfish	Highly Migratory
Commercial	648		168 (Loligo/Butterfish) 30 (Illex)	
Charter/Party	27		20 (Squid/Mackerel/Butterfish)	
Limited Access – All areas		9		
Limited Access – Areas 2 & 3		4		
Incidental		33	494 (Squid/Butterfish)	30
Open Access		553		
Mackerel			579	
Mackerel Tier 1			5	
Mackerel Tier 2			7	
Mackerel Tier 3			30	

Figure 108 - Federal l permits for 2011 held by vessels enrolled in sectors during the 2012 fishing year.

Category	
Area 1	202
Area 2	78
Area 3	8
Area 4	1
Area 6	7
Outer Cape	64

Sector fishing effort most likely to be redistributed to fish in sector exemption areas

As a rough estimate of the number of sectors and sector vessel that are likely to fish in the proposed exemption areas, the 2011 calendar year fishing effort by sector-enrolled vessels are summarized in the table below. A total of 113 vessels fished in this boundary area during 2011, which participated in 13 sectors shown below.

These data were derived from vessel monitor system polling (VMS) based on computed minimum vessel speed between pollings. Speed thresholds were applied based on beginning and end haul locations and times on observed trips using specific gear types. Generally, speeds greater than these amounts were considered to be not fishing, i.e. steaming between fishing locations or steaming to/from port. As a result, the days fished summary in the table below will always be considerably less than days fished from other sources, like vessel trip reports (VTR). For this reason, they may differ from the effort data in Section ??? (Groundfish PDT sector effort summaries in AE).

Most of the fishing effort by sector vessels in the 25 nm boundary were around the Cashes Ledge Closed Area and the Western Gulf of Maine Closed Area. The boundary around the Western Gulf of Maine area DID NOT include the western edge (i.e. inshore) of the closed area, because it would include effort by some or many smaller coastal vessels that are less likely to fish on the offshore boundary of the Western Gulf of Maine area. Fishing effort that fell between two areas whose buffers overlapped were split based on an equidistant line, not double counted.

While effort around one area may be redistributed to fish in a different area (trips to the east of Closed Area I might be more likely to fish in Closed Area II, for example), this table is a best estimate of the amount of re-distributed effort that is most likely to be used in the proposed sector exemption areas. Some effort around the boundaries will of course still occur, but fishing effort that normally occurs further away may also be drawn into the proposed sector exemption areas.

Total effort in these new fishing areas may be higher or lower, depending on how well vessels can target underharvested species like haddock, pollock, and redfish, while avoiding species with low ACLs like cod and yellowtail flounder. It is also possible that some fishermen will target other species like cod, monkfish, and skates in the proposed sector exemption areas.

Figure 109 - Number of vessels and days fished within 25 nm of year round groundfish closed areas by sector enrolled vessels during calendar year 2011. Gears: OTF=standard trawl; OHS=haddock separator trawl; GNS=bottom set gillnet.

Days fished	Column Labels						
Row Labels	**Cashes Ledge**	**Closed Area I**	**Closed Area II**	**Nantucket Lightship**	**WGoM**	**Grand Total**	**Vessels**
Fixed Gear Sector		62.1		45.7	7.8	115.7	
GNS		62.1		45.7	7.8	115.7	19
NEFS 10	1.6	5.3		5.3	4.2	16.5	
GNS	1.6			5.3	1.9	8.9	3
OTF		5.3			2.3	7.6	1
NEFS 11	55.8		9.5		0.9	66.1	
GNS	55.8		9.5		0.9	66.1	4
NEFS 12	87.9		8.4		38.3	134.7	
GNS	87.9		8.4		38.3	134.7	3
NEFS 13	8.2	9.7	5.4	15.4		38.7	
OTF	8.2	9.7	5.4	15.4		38.7	11
NEFS 2	2.3	5.2	5.2		6.4	19.1	
OHS	2.3	5.2	5.2		5.9	18.6	3
OTF					0.4	0.4	1
NEFS 3	2.3	0.1		5.3	35.3	43.0	
GNS	2.3	0.1		5.3	35.3	43.0	8
NEFS 5		5.5	1.9	9.9		17.3	
GNS				0.1		0.1	1
OTF		5.5	1.9	9.8		17.2	7
NEFS 7	5.5	23.4	10.6	5.9	14.2	59.5	
GNS	5.5				14.2	19.6	2
OHS		6.1	9.3			15.3	2
OTF		17.3	1.4	5.9		24.5	5
NEFS 8		1.6		3.7		5.3	
OTF		1.6		3.7		5.3	2
NEFS 9	2.9	33.7	26.8	7.5	4.6	75.4	
OHS	2.9	27.5	26.3	0.8	4.6	62.1	1
OTF		6.2	0.4	6.6		13.3	4
Port Clyde Community Groundfish Sector	28.8				82.4	111.1	
GNS	16.1				82.4	98.5	9
OTF	12.7					12.7	4
Sustainable Harvest Sector 1	131.8	18.3	52.9	0.2	71.4	274.6	
GNS	86.4		1.8		45.9	134.0	4
OHS	3.3	18.0	51.1	0.2	4.1	76.6	8
OTF	42.1	0.4			21.5	64.0	11
Grand Total	327.0	164.9	120.6	99.0	265.5	977.0	113

6.6.4 Summary of Trawl Performance Data on Observed Trips

The purpose of this analysis is to examine the observed catches of trips using different gear types on Georges Bank and in The Gulf of Maine. The data was compiled from at-sea monitoring and sea sampling data from 2003-2012. The data was then organized to show catch compositions, comparisons of trawl effectiveness and catch ratios, and total catches. The results of this analysis could give an indication as to the amount of fishing effort that may be concentrated into the sector exemption areas.

6.6.4.1 Distribution of observed hauls using trawl gear

The distribution of observed fishing indicated by the gear type used on each observed tow is shown in Figure 110. This allows for a visual representation of the data used to create the following tables. The closed areas are indicated by the dashed lines around their perimeter. The map shows more intense fishing effort in concentrated areas, specifically around the boundaries of some closures and the northern and southern edges of Georges Bank. There is a concentration of hauls using the standard trawl around the WGOM Closed Area, Closed Area I and on both the northern and southern edges of Georges Bank. The ruhle and separator trawls are used primarily in the southern Georges Bank area and around Closed Area 2. A number of hauls inside Closed Area 2 using the separator trawl are also visible but these hauls are from the Haddock Special Access Program. The amount of activity occurring in these locations, specifically those around the closed area perimeters, could reflect higher catch totals.

The target species of the hauls performed by vessels using the standard trawl gear are indicated in Figure 111. Hauls focusing on some species appear to congregate in specific areas while hauls targeting other species are more spread out. Cod is the most spread out, building up along the northern edge of Georges Bank and all around the perimeter of the WGOM Closed Area as well as the eastern side of The Gulf of Maine. The other target species around the WGOM Closed Area are White Hake, American Plaice, Pollock, Monkfish and Haddock. The concentration of gray dots on the eastern side of the WGOM Closed Area represents a large amount of hauls in that area targeting species other than those specifically mentioned in the legend. There is a greater presence of hauls targeting Redfish and Monkfish further east in the Gulf of Maine. Trips on Georges Bank mostly focus on haddock and as such, haddock is more frequent and concentrated on the northern and southern edges of Georges Bank on the map. There is also a concentration of trips targeting Winter Flounder on the northern edge. Redfish is also a target species on the northern edge of Georges Bank and both Redfish and Pollock on the southern edge, with some trips targeting Cod as well.

The target species of the hauls performed by vessels using the separator trawl gear are indicated in Figure 112. A much lower number of hauls is observed, indicating a less frequent use of the haddock separator trawl in these areas from 2003-2012. The largest concentration of hauls is around the northern and southern edges of Georges Bank, as well as around the borders of Closed Area I and II. The haddock hauls occurring inside Closed Area II are due to the Haddock SAP implemented in 2009. These hauls are predominantly targeting Haddock. The concentration of winter flounder hauls occurring on the northern edge of Georges Bank and the yellowtail flounder hauls on the southern edge are likely due to the excluder type being miscoded. It is highly unusual for vessels using a separator trawl to target yellowtail flounder and winter flounder. Hauls targeting other species are also spread out along the northern edge of Georges Bank. There is a concentration of hauls targeting Pollock around the southeast corner of the WGOM Closed Area as well as spreading out further east into the Gulf of Maine, where a number of hauls targeting Redfish and other species are spread out.

Figure 110 - Observed hauls by trawl type.

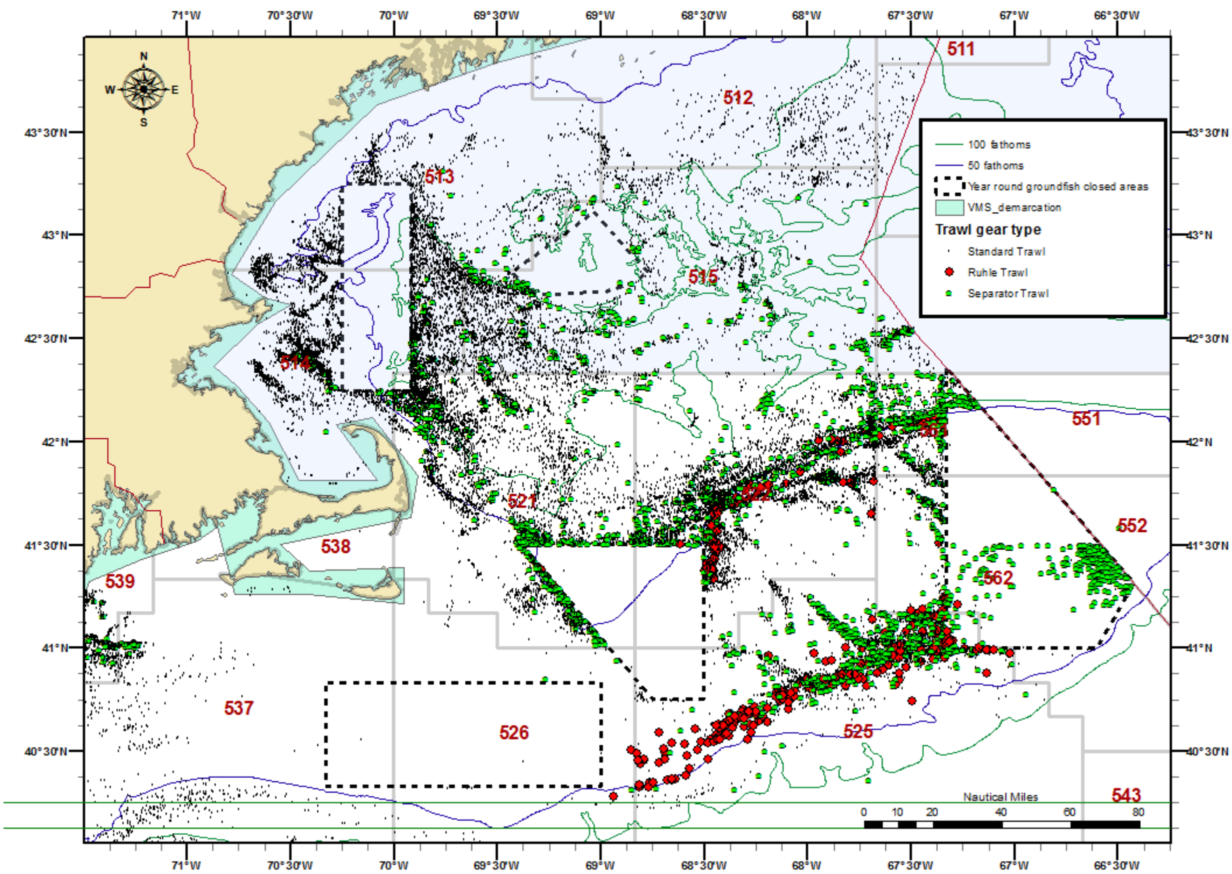


Figure 111 - Observed hauls by target species using a standard trawl

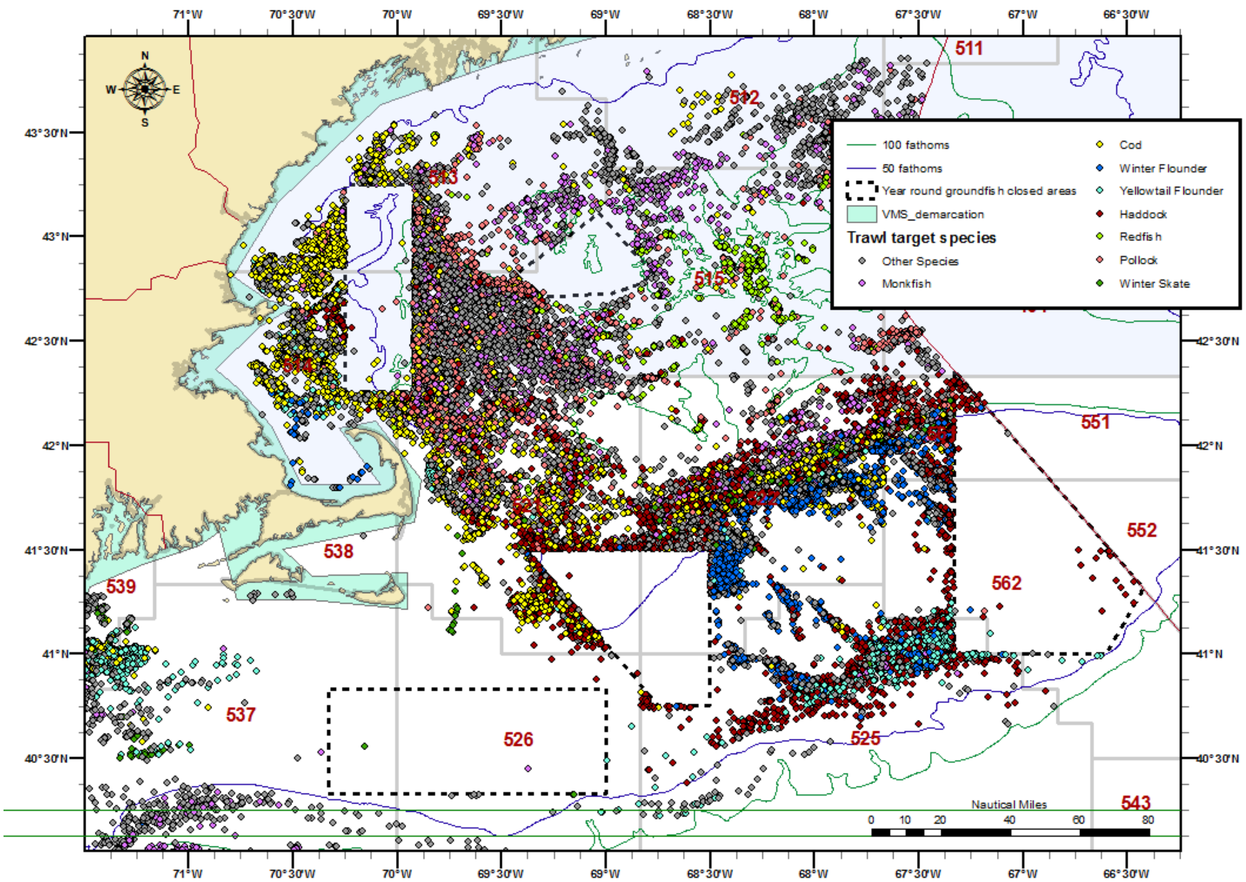
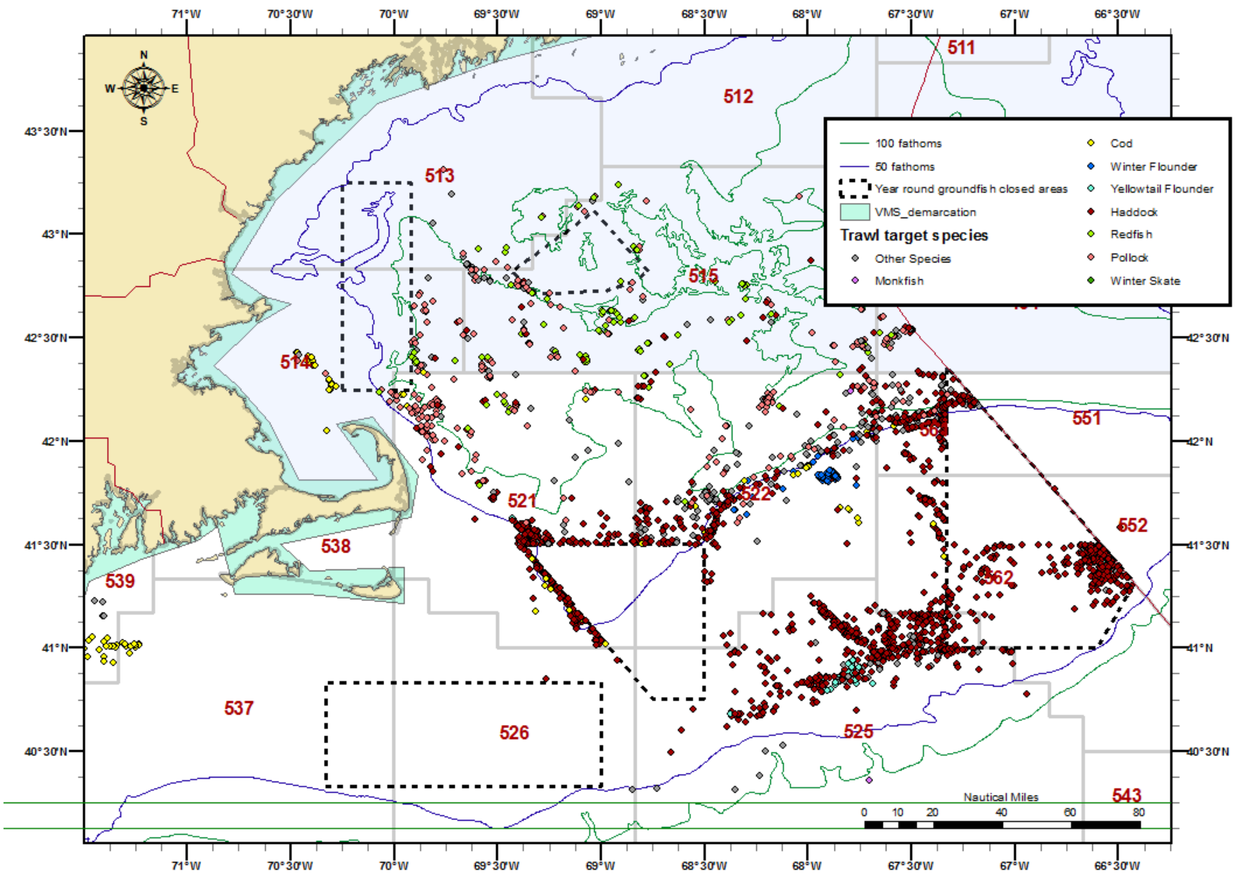


Figure 112 - Observed hauls by target species using a separator trawl



6.6.4.2 Standard and Separator trawl performance

The annual VTR data is summarized in Figure 113 for all trips that used a standard or separator trawl on Georges Bank. The total number of vessels, trips, hauls and landings has steadily decreased since 2004. This is evidence that vessels are using the standard and separator trawls less frequently in the VTR trip data. The annual VTR data summarized in Figure 114 pertains to all trips that used a standard or separator trawl in The Gulf of Maine. The data in Figure 114 has not been as consistent, showing numerous increases and decreases in the total reported landings. The highest amount of total reported landings is in 2011, yet the highest number of total trips and total hauls are in 2005. The total number of vessels has steadily decreased over the evaluated time period however, indicating that fewer vessels are using the standard or separator trawl in The Gulf of Maine, yet are reporting higher total landings.

Total catches (kept and discarded) of the top twenty-five species on hauls using a standard trawl on Georges Bank are shown in
Figure 115. This table includes updates to data reported in Amendment 16. The species were ranked in Figure 115 so as to reflect their ranking in the total overall catch specifically from 2009-2011. The ten most-caught species from 2009-2011 were winter skate, little skate, haddock, cod, winter flounder, red hake, monkfish, pollock, silver hake and yellowtail flounder. Skates (winter skate and little skate) accounted for around one-third of the catch each year from 2009 to 2011. When considering the entire evaluated period, the rankings are different. The ten most-caught species from 2003-2012 are winter skate, little skate, haddock, monkfish, cod, yellowtail flounder, winter flounder, pollock, red hake and spiny dogfish. Comparing the entire evaluated period rankings to the 2009-2011 rankings, cod, winter flounder, red hake and spiny dogfish moved up. Monkfish and yellowtail flounder moved down. Winter skate, little skate, haddock and pollock remained the same.

The greatest number of tows and highest total catch in
Figure 115 is in 2005. The catch totals for little skate and flounder in 2005 increase significantly relative to catches in previous hauls. The catch composition over the time period does not remain consistent, with numerous species experiencing increases or decreases between years. These comparisons are best observed from 2007-2008 and 2009-2010 where the number of hauls remains consistent. The observed catch of winter skate, haddock, yellowtail flounder, winter flounder and pollock increased from 2007-2008 while the observed catch of little skate, monkfish, cod and spiny dogfish increased. The observed catch comparisons from 2009-2010 are different with monkfish, winter flounder, pollock and red hake observed catch increasing and winter skate, haddock, little skate, cod and yellowtail flounder observed catch decreasing. There was also a large amount of lobster and barndoor skate each year, possibly indicating a large amount of discards of those species.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using a standard trawl in The Gulf of Maine are shown in Figure 116. This table includes updates to data reported in Amendment 16. The species were ranked in Figure 116 so as to reflect their ranking in total catch specifically from 2009-2011. The ten most-caught species from 2009-2011 were pollock, cod, monkfish, white hake, redfish, plaice, spiny dogfish, winter skate, witch flounder and lobster. Unlike the total catches on observed hauls on Georges Bank, the total catches in Figure 116 are much closer to each other. No one species holds a clear majority of catch over another, indicating a more even spread of catch composition on observed hauls using a standard trawl in The Gulf of Maine. Analyzing the entire evaluated period, the ten most-caught species were pollock, monkfish, cod, white hake, redfish, plaice, spiny dogfish, witch flounder, winter skate and yellowtail flounder. Comparing the entire evaluated period rankings to the 2009-2011 rankings, cod, winter skate and lobster moved up. Monkfish, witch flounder and yellowtail flounder moved down. Pollock, white hake, redfish, plaice, and spiny dogfish remained the same.

The number of observed hauls each year in The Gulf of Maine exhibits some similarities to Georges Bank. There was an increase in standard trawl hauls in 2005, but there was also a large increase in hauls in 2010 that is not mirrored in the observed total of Georges Bank hauls. This is most likely due to the increase in the at-sea monitoring program in 2010 or possibly the Pollock ACL increase. The highest number of observed hauls occurs in 2011 and indicates an increase of sea sampling focus in The Gulf of Maine since 2009. The number of hauls in the previous years shows some fluctuations, but the consistent number of hauls from 2008-2009 allows for a comparison of catch composition. The total observed catch of pollock and redfish decreased while the total observed catch of cod, monkfish, white hake, plaice, spiny dogfish and winter skate increased.

Total catches (kept and discarded) of the top twenty-five species on hauls using a separator trawl on Georges Bank are shown in Figure 117. This table includes updates to data reported in Amendment 16. The species were ranked in Figure 117 so as to reflect their ranking specifically from 2009-2011. The ten most-caught species from 2009-2011 were haddock, winter skate, cod, pollock, little skate, spiny dogfish, winter flounder, redfish, yellowtail flounder and white hake. Haddock makes up a large majority of the total catch each year from 2009-2011. Analyzing the entire evaluated period, the ten most-caught species were haddock, winter skate, little skate, cod, pollock, winter flounder, yellowtail flounder, spiny dogfish, redfish and red hake. There are numerous differences in the two sets of rankings. When comparing the entire evaluated period rankings to the 2009-2011 rankings, cod, redfish, pollock, spiny dogfish and red hake moved up. Little skate, winter flounder and yellowtail flounder moved down. Haddock and winter skate remained the same.

The separator gear is used much less frequently on Georges Bank than the standard trawl, as evidenced by the lower number of hauls even after the Haddock SAP was implemented in 2009. The number of hauls each year before 2009 remained relatively consistent, with the largest amount occurring in 2005. However, the implementation of the Haddock SAP and the increase in the at-sea monitoring program led to increased hauls from 2009-2011 with the separator trawl on Georges Bank. The total catch of the ten most-caught species greatly increased, with Haddock and Winter Skate experiencing the most significant increase. The year with the highest number of observed hauls, therefore the highest observed total catch, in Figure 117 is 2010. Haddock makes up nearly fifty percent of the total catch that year and winter skate makes up about twenty percent.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using a separator trawl in The Gulf of Maine are shown in Figure 118. This table includes updates to data reported in Amendment 16. The species were ranked in Figure 118 so as to reflect their ranking in total catch specifically from 2009-2011. The ten most-caught species from 2009-2011 were redfish, pollock, red hake, silver hake, spiny dogfish, cod, herring, white hake, offshore hake and haddock. Analyzing the entire evaluated period, the ten most-caught species were pollock, redfish, red hake, silver hake, spiny dogfish, herring, cod, white hake, offshore hake and haddock. The comparison of the entire evaluated period rankings with the 2009-2011 rankings yields fewer differences than in previous tables. Redfish and cod moved up while pollock and herring moved down. Red hake, silver hake, spiny dogfish, white hake, offshore hake and haddock remained the same.

Fewer vessels use the separator trawl in The Gulf of Maine, indicated by the lowest catch totals and hauls per year in Figure 118. The implementation of the Haddock SAP in 2009 did lead to an increased amount of sea sampling in 2010 and 2011, however. Redfish and pollock make up the vast majority of the total catch in this time period. Haddock separator trawls were sometimes used by the fleet to target Pollock without catching flatfish species such as flounders and monkfish, potentially explaining the large increase in pollock catch. The catch totals of the other species did not increase as significantly after 2009. The high catch of white hake, red hake and herring could possibly indicate that a high number of vessels in the small-mesh fishery use the separator gear in The Gulf of Maine.

Figure 113 - Annual VTR data for trips using standard and separator trawls in Georges Bank. (Statistical Areas 521, 522, 525, 526, 561 and 562)

	Fishing Year								
Standard and Separator Trawl	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total vessels	327	307	267	263	262	219	201	198	121
Total trips	7,341	6,698	5,754	5,674	4,854	4,075	4,591	4,625	1,689
Total reported hauls	481,563	492,543	407,273	420,907	365,095	300,526	233,368	299,142	100,005
Total reported landings (lbs.)	62,232,028	53,484,447	41,388,416	45,696,898	47,574,263	44,200,388	37,628,694	39,312,166	12,505,075

Figure 114 - Annual VTR data for trips using standard and separator trawls in The Gulf of Maine. (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

	Fishing Year								
Standard and Separator Trawl	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total vessels	277	246	206	186	171	174	149	147	110
Total trips	7,343	7,431	6,279	6,105	6,240	6,874	2,791	4,123	1,559
Total reported hauls	239,979	245,132	164,232	165,474	160,152	165,612	116,529	174,667	56,639
Total reported landings (lbs.)	19,532,834	19,474,520	14,708,511	17,960,941	18,261,091	19,301,565	15,760,855	21,983,589	7,127,686

Figure 115 - Catch (lbs.) on observed hauls using a standard trawl on Georges Bank. (Statistical Areas 521, 522, 525, 526, 561 and 562)

	Fishing Year 2004	2005	2006	2007	2008	2009	2010	2011	2012
Standard Trawl									
# of Hauls	10,657	13,615	7,803	9,796	9,983	7,511	7,351	9,398	2,663
Total Catch.	21,474,442	27,899,678	15,371,439	19,491,831	20,596,533	18,235,117	15,846,257	18,551,413	4,953,834
Total Discards	8,912,169	12,896,762	7,527,467	9,621,156	9,158,590	8,677,497	7,448,917	8,239,680	2,260,962
Winter Skate.	3,568,629	4,678,453	2,881,492	5,628,977	5,816,333	4,837,982	3,797,066	3,961,164	831,375
Little Skate.	2,643,524	4,773,984	2,285,857	2,519,011	2,269,772	2,535,834	1,581,101	1,748,357	461,091
Haddock.	3,244,057	2,527,039	1,147,448	2,089,239	2,803,785	2,093,335	1,893,423	1,401,235	237,700
Cod.	1,455,822	1,013,459	985,231	1,802,062	1,394,656	1,017,433	898,556	1,176,950	207,330
Winter Flounder.	580,399	1,448,197	527,896	600,815	880,245	818,696	878,574	1,227,622	439,491
Red Hake.	204,227	577,795	296,694	398,585	382,938	851,363	1,094,746	788,572	101,278
Monkfish.	2,013,680	2,779,092	1,757,326	969,796	739,422	562,716	677,417	1,111,989	422,179
Pollock.	290,592	358,355	388,352	354,778	762,904	315,234	840,397	1,177,634	382,138
Silver Hake.	154,502	491,210	160,216	232,748	295,281	668,434	883,604	604,371	83,225
Yellowtail Flounder.	1,483,225	2,440,679	671,813	650,179	876,573	857,903	485,134	680,311	39,139
Spiny Dogfish.	249,940	356,845	305,967	744,494	565,875	380,017	344,857	802,284	361,317
Barndoor Skate.	123,183	424,292	338,325	307,137	275,612	419,532	397,700	467,092	188,271
Plaice.	254,782	337,268	284,581	248,887	333,038	376,739	333,743	539,498	298,555
Redfish.	118,044	74,887	81,957	147,964	168,985	223,996	352,037	502,530	219,019
Lobster.	308,299	380,881	249,309	282,147	368,675	299,070	308,946	421,300	96,270
White Hake.	150,506	157,830	92,945	116,989	162,436	154,132	317,754	539,478	124,851
Illex Squid	12,936	25,218	58,845	27,836	31,439	745,186	53,939	59,590	2,600
Witch Flounder.	650,176	622,915	335,652	243,925	270,683	223,905	209,908	371,227	121,981
Offshore Hake.	49,717	86,586	134,142	165,478	86,976	180,477	210,697	183,897	18,054
Black Sea Bass	186,580	463,602	294,813	253,712	133,260	197,876	153,928	186,660	20,827
Loligo Squid	123,572	460,530	244,652	163,382	108,239	66,557	111,025	105,669	4,223
Windowpane Flounder.	217,404	347,756	276,904	184,017	148,267	141,045	62,749	67,740	14,210
Thorny Skate.	68,836	72,520	86,796	66,445	63,472	59,206	67,756	88,588	30,440
Smooth Skate.	63,372	66,925	75,165	67,858	53,181	57,121	51,273	85,656	32,084
Fourspot Flounder.	35,528	105,505	97,800	71,843	36,379	70,257	44,943	44,097	3,858
Sea Scallop.	194,711	329,730	266,871	122,207	92,987	54,018	20,157	40,963	13,428
Butterfish.	3,033	6,606	8,573	3,894	2,950	23,911	45,091	31,940	2,185
Ocean Pout.	34,840	46,526	22,746	32,958	25,062	34,491	24,567	13,432	4,738
Mackerel.	1,097	2,927	3,320	4,341	49,724	18,955	25,673	3,117	105
Herring.	3,959	12,021	17,258	7,412	2,195	10,966	12,273	5,852	1,779
Bluefish.	2,258	11,087	6,315	9,022	7,662	7,173	9,811	4,496	1,954
Halibut.	4,648	4,708	4,745	4,199	5,899	5,197	5,506	9,415	4,596
Wolffish.	6,531	8,436	7,214	7,269	6,150	2,297	3,036	4,005	2,850
Red Crab.	26,485	23,636	40,001	17,288	24,407	3,597	3,179	2,126	1,234
Striped Bass.	8,021	19,049	4,488	49,098	25,141	758	1,588	3,909	10
Alewife.	112	641	231	387	333	1,723	3,955	570	81
Rosette Skate.	1,054	624	408	447	940	1,185	290	376	0
Blueback Herring	725	732	212	206	100	100	1,305	21	17
Clearnose Skate.	3,161	8,229	847	27,071	3,592	491	226	9	0
Tilefish.	482	113	0	0	98	471	5	87	0
Scup.	5	25	8	32	2	235	65	7	2
Gulf Stream Flounder	43	595	176	0	8	76	0	0	0
Tautog.	89	22	28	82	129	0	10	2	69
Southern Flounder.	0	0	0	29	0	0	0	0	0

Figure 116 - Catch (lbs.) on observed hauls using a standard trawl in The Gulf of Maine. (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

	Fishing Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Standard Trawl									
# of Hauls	2,148	2,595	754	1,625	1,893	1,836	4,863	7,073	2,010
Total Catch.	3,167,652	3,142,941	1,346,800	2,391,390	2,992,601	3,017,290	7,755,192	11,199,122	2,792,352
Total Discards	647,974	858,384	371,012	434,078	582,238	664,571	1,397,046	2,198,383	612,753
Pollock.	562,467	475,409	380,695	785,512	966,511	734,155	1,134,059	1,939,815	627,527
Cod.	187,435	252,001	62,790	127,701	319,667	354,277	1,320,759	1,772,435	174,942
Monkfish.	909,427	637,874	238,325	435,634	402,527	457,648	1,087,025	1,553,075	249,296
White Hake.	251,457	205,683	75,929	171,648	197,802	249,904	939,732	1,182,716	247,512
Redfish.	59,070	63,105	74,575	175,540	280,696	206,652	682,308	1,116,629	498,303
Plaice.	137,982	165,101	44,687	130,817	166,888	214,855	653,545	704,041	183,214
Spiny Dogfish.	192,674	281,527	103,474	124,032	91,210	152,284	401,466	713,425	247,734
Winter Skate.	42,905	99,487	59,929	13,630	54,241	112,662	318,934	376,529	33,101
Witch Flounder.	206,388	178,633	34,339	66,570	68,048	85,632	215,981	307,418	106,608
Lobster.	59,678	57,161	20,380	41,296	41,302	51,036	149,485	213,755	61,628
Haddock.	74,681	74,627	26,961	28,827	57,026	60,097	183,685	163,206	27,160
Yellowtail Flounder.	71,698	124,376	19,095	25,628	67,576	47,103	155,691	173,249	72,271
Thorny Skate.	40,352	52,300	38,014	36,215	31,252	33,134	86,832	142,322	49,265
Barndoor Skate.	3,449	8,112	3,237	8,527	10,878	24,473	57,640	140,879	41,888
Little Skate.	55,614	76,262	43,564	42,793	36,194	37,754	59,365	115,546	43,069
Red Hake.	30,648	28,698	19,977	36,612	45,678	46,933	56,813	97,610	16,915
Smooth Skate.	15,423	16,741	5,748	14,220	11,283	20,039	34,412	95,332	21,208
Winter Flounder.	55,893	68,929	17,393	22,084	31,662	21,623	35,734	61,626	23,906
Offshore Hake.	6,548	6,741	8,612	14,196	23,940	20,177	36,224	53,086	6,415
Silver Hake.	23,964	21,952	11,365	22,403	21,730	26,523	20,154	43,158	10,500
Windowpane Flounder.	4,555	8,833	5,601	4,699	9,879	3,881	8,278	18,923	1,719
Wolffish.	4,871	6,317	1,894	2,460	1,650	949	5,394	11,572	6,476
Illex Squid	281	327	1,751	336	803	3,024	4,527	10,179	1,135
Herring.	14,255	56,004	10,329	10,782	11,340	2,357	1,320	13,774	407
Halibut.	1,859	1,027	774	1,297	1,511	1,560	4,391	9,388	3,776
Sea Scallop.	10,601	10,900	985	1,144	2,577	1,910	1,557	6,997	1,455
Alewife.	629	1,654	599	36	673	6,146	99	1,874	30
Fourspot Flounder.	1,786	1,048	478	620	1,055	2,548	2,494	2,347	2,479
Red Crab.	2,339	2,228	2,303	1,205	397	1,142	2,403	3,683	614
Ocean Pout.	6,260	4,742	880	2,000	3,666	519	1,246	3,662	757
Striped Bass.	287	447	136	158	68	34	1,424	2,836	411
Loligo Squid	644	54	57	203	508	2,348	308	742	59
Butterfish.	677	50	162	159	43	718	146	1,125	51
Bluefish.	175	41	27	84	35	67	549	1,233	94
Black Sea Bass	133	288	53	123	181	869	211	505	73
Mackerel.	134	130	15	4	61	91	114	509	29
Blueback Herring	1,387	149	25	0	244	27	100	250	5
Clearnose Skate.	862	516	6	157	175	56	145	41	0
Scup.	7	7	2	0	26	70	3	43	6
Rosette Skate.	784	8	0	0	7	32	18	17	0
Tilefish.	16	0	0	0	0	8	8	31	0
Tautog.	4	0	0	13	1	0	5	35	0
Gulf Stream Flounder	9	37	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

Figure 117 - Catch (lbs.) on observed hauls using a haddock separator trawl on Georges Bank (Statistical Areas 521, 522, 525, 526, 561 and 562)

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Haddock Separator Trawl									
# of Hauls	187	356	104	57	35	588	2,041	1,181	27
Total Catch.	334,187	641,263	178,988	46,453	132,702	1,498,626	4,539,797	2,177,690	18,103
Total Discards	117,630	281,755	91,772	18,845	7,222	556,809	1,362,355	519,235	1,860
Haddock.	82,322	127,021	65,886	7,591	94,714	678,268	2,244,303	1,020,461	5,392
Winter Skate.	48,097	55,026	18,544	2,471	1,619	288,747	842,993	296,008	1,329
Cod.	20,460	32,053	12,975	2,918	2,307	92,433	222,087	123,494	561
Pollock.	15,338	3,572	10,010	961	21,185	32,414	223,602	166,801	3,145
Little Skate.	36,517	79,677	22,767	581	2,851	101,809	219,054	72,708	36
Spiny Dogfish.	1,406	1,619	6,006	3,075	358	57,074	96,646	66,684	362
Winter Flounder.	11,875	58,818	12,534	2,058	3,159	19,895	80,175	78,889	217
Redfish.	573	197	208	454	1,227	9,666	78,707	70,255	3,583
Yellowtail Flounder.	13,946	74,087	8,729	669	1,345	29,131	80,646	45,888	54
White Hake.	998	863	1,519	41	479	29,377	55,530	32,492	1,818
Barndoor Skate.	589	12,030	1,322	20	345	24,153	60,919	27,959	286
Red Hake.	43,370	553	31	13,551	16	33,946	42,281	27,497	76
Silver Hake.	39,286	149	2	9,745	6	31,930	30,580	22,773	69
Monkfish.	14,315	31,271	3,404	547	1,478	17,784	31,675	35,217	517
Lobster.	5,996	12,176	673	478	661	19,814	33,017	20,286	394
Plaice.	1,875	19,511	1,922	875	42	5,339	20,731	20,481	68
Witch Flounder.	12,803	12,483	909	329	674	4,101	14,325	12,845	39
Black Sea Bass	721	1,903	1,085	4	0	898	14,070	9,711	0
Windowpane Flounder.	2,198	2,318	2,881	216	0	7,893	9,402	4,442	0
Offshore Hake.	4,084	404	29	3,806	10	1,997	11,692	4,724	7
Loligo Squid	73	5	1	47	0	3,501	11,809	986	0
Thorny Skate.	283	339	27	14	25	5,091	8,129	2,776	3
Sea Scallop.	453	3,640	276	1	0	115	6,259	3,203	11
Smooth Skate.	206	621	301	23	14	1,939	4,337	3,191	16
Fourspot Flounder.	192	2,195	21	0	0	4,178	2,762	545	5
Ocean Pout.	62	878	1,529	10	11	682	4,013	1,064	0
Halibut.	34	377	42	29	44	567	1,545	1,136	12
Butterfish.	92	0	0	4	0	577	2,080	393	0
Striped Bass.	84	0	0	229	0	1,982	487	78	0
Illex Squid	81	12	93	1	1	86	1,116	1,202	32
Herring.	2,476	241	11	3,438	4	144	537	1,021	16
Bluefish.	116	23	10	54	0	19	1,440	243	0
Mackerel.	299	77	0	0	0	102	697	370	0
Wolffish.	0	209	60	0	25	55	321	382	0
Blueback Herring	1,303	44	0	0	0	52	162	1	0
Alewife.	405	0	0	0	0	36	48	86	0
Red Crab.	256	36	0	0	0	62	34	17	0
Rosette Skate.	0	0	0	0	0	10	0	77	0
Tilefish.	0	0	41	0	0	0	10	13	0
Clearnose Skate.	50	0	2	0	36	0	3	0	0
Scup.	2	0	0	0	0	1	0	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0
Tautog.	34	0	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

Figure 118 - Catch (lbs.) on observed hauls using a haddock separator trawl in the Gulf of Maine (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Haddock Separator Trawl									
# of Hauls	29	1	24	64	37	40	347	261	18
Total Catch.	56,904	1,898	85,504	169,547	137,701	91,993	788,537	655,539	14,563
Total Discards	35,820	176	5,759	9,277	6,010	14,116	112,936	70,300	3,391
Redfish.	10	223	4,910	8,605	4,896	5,443	291,211	191,501	3,650
Pollock.	16	955	73,132	132,376	118,296	5,709	225,040	228,893	4,955
Red Hake.	12,962	0	992	14,623	5,526	36,841	73,618	55,289	23
Silver Hake.	10,765	0	579	9,894	1,764	20,249	53,601	40,563	23
Spiny Dogfish.	30,220	0	1,243	2,089	3,106	9,010	41,278	30,299	2,174
Cod.	109	193	533	1,416	2,702	7,776	18,281	41,523	134
Herring.	11,335	0	444	3,388	188	9,110	21,991	32,674	0
White Hake.	0	230	238	753	220	4,544	33,913	21,437	1,312
Offshore Hake.	2,140	0	414	4,729	3,762	16,591	20,017	14,726	0
Haddock.	259	135	545	1,587	247	3,463	16,172	10,094	1,004
Monkfish.	132	96	1,888	1,781	706	773	17,622	7,908	535
Plaice.	572	0	465	494	103	583	7,704	5,487	77
Winter Skate.	0	0	25	41	4	352	8,218	4,096	32
Lobster.	105	0	499	637	369	1,058	5,680	5,090	98
Little Skate.	0	10	0	75	20	30	1,531	3,877	6
Witch Flounder.	65	15	208	385	40	268	3,436	1,620	131
Butterfish.	17	0	1	125	0	900	3,368	1,033	0
Barndoor Skate.	0	0	6	111	0	353	2,921	1,874	175
Yellowtail Flounder.	33	0	23	95	83	629	2,447	2,049	1
Winter Flounder.	127	0	44	157	46	424	2,884	740	7
Thorny Skate.	12	0	50	189	142	64	2,924	606	36
Smooth Skate.	0	0	77	39	0	24	828	383	50
Alewife.	127	0	0	0	31	184	505	402	0
Illex Squid	52	2	1	1	81	61	427	447	13
Wolffish.	0	0	14	12	34	12	295	600	0
Striped Bass.	0	0	0	15	0	0	12	823	0
Loligo Squid	87	0	0	23	12	81	500	68	0
Blueback Herring	61	0	0	0	0	33	298	131	0
Fourspot Flounder.	14	0	7	18	5	51	236	70	0
Bluefish.	82	0	0	0	0	12	278	0	0
Mackerel.	24	0	3	0	2	3	256	13	0
Windowpane Flounder.	2	0	0	4	43	27	216	18	0
Halibut.	0	0	0	22	0	0	194	39	74
Ocean Pout.	28	0	3	65	1	15	73	109	0
Black Sea Bass	5	0	0	0	0	0	40	0	0
Red Crab.	0	0	0	0	0	0	4	4	0
Scup.	0	0	0	0	0	3	2	0	0
Sea Scallop.	1	0	1	17	0	0	0	2	0
Rosette Skate.	0	0	0	0	0	0	1	0	0
Tautog.	0	0	0	0	0	0	0	0	0
Clearnose Skate.	0	0	2	0	12	0	0	0	0
Tilefish.	0	0	0	0	0	0	0	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

The same data in the previous tables are shown in Figure 119 but are represented as ratios to allow for a simple comparison between the catch of target and other species on Georges Bank. A ratio over 1.00 indicates that there was a greater catch of the species in the numerator than the species in the denominator. For example, the Haddock/Cod ratio in 2005 is 2.49, indicating that for every 1 lb. of observed catch of Cod there was 2.49 lbs. of observed catch of Haddock. The opposite is true for ratios under 1.00, indicating a lower catch of the species in the numerator than the denominator. These observed catch ratios are shown as a bar graph in Figure 121. The observed catch of each species is represented as a percentage within the total observed catch of all species for each year in Figure 120. The purpose of Figure 119 and Figure 120 is to provide an alternative view of the catch of each species on Georges Bank hauls and to allow for comparisons of the catch of standard and separator trawls.

The target species in Figure 119 are Haddock, Redfish, Pollock, Monkfish and Skates. The most notable difference between the two gear types in this table are the comparison of the Total Catch/species ratios. The haddock separator trawl has much higher Total Catch/flounder ratios, almost double than those for the standard trawl. This indicates that the observed catch totals of Yellowtail Flounder and Winter Flounder for the haddock separator trawl are much lower than the respective ratios for the standard trawl. This is reflected in Figure 120, as the catch percentage of winter and yellowtail flounder for the separator trawl are half of the respective percentages for the standard trawl. Vessels using the separator trawl also caught four times more Haddock/Cod than vessels using the standard trawl. There is a consistent difference in Figure 119 between the species/cod ratios and the species/flounder ratios for both gear types. Cod generally makes up a larger amount of total catch each year in Figure 120 than winter flounder or yellowtail flounder. There are much higher Haddock/species ratios for the observed separator trawl data than the observed standard trawl data. This is reflected in Figure 120, where Haddock makes up thirty-five percent more of the observed total catch for separator trawls than standard trawls. The low percentage of Haddock in the standard trawl data indicates that vessels are not focusing on haddock with that gear type. The standard trawl had more observed catch of Monkfish than the separator trawl and the separator trawl had more observed catch of Pollock.

A simple comparison between the observed catch of target and other species in The Gulf of Maine can be observed in Table 64. These observed catch ratios are shown as a bar graph in Figure 122. A ratio over 1.00 indicates that there was a greater catch of the species in the numerator than the species in the denominator. For example, the Haddock/Yellowtail Flounder ratio in 2003 is 2.43, indicating that for every 1 lb. of observed catch of yellowtail flounder there was 2.43 lbs. of observed catch of Haddock. The opposite is true for ratios under 1.00, indicating a lower catch of the species in the numerator than the denominator. The same data is displayed in Table 65 except the observed catch of each species as a percentage within the total observed catch of all species for each year.

These data show a much greater variation in the ratios of target to other species catch, most notably for the pollock/species, redfish/species and total catch/species observed catch ratios in the separator trawl data. This could be a result of the smaller sample size. Redfish and pollock make up nearly sixty five percent of total catch in the separator trawl data, indicating that vessels are using separator trawls to specifically target these two species. Comparatively, pollock and redfish make up twenty eight percent of the total catch in the standard trawl data. The high observed catch ratios of target species/flounder are expected due to the minimal presence of winter and yellowtail flounder in The Gulf of Maine. The species/cod ratios are generally the lowest ratios for each target species, indicating a comparatively larger amount of cod being caught in these observed hauls than yellowtail or winter flounder. The percentage of cod in total catch is much higher for both gear types in Table 65. Cod makes up a larger amount of the observed standard trawl catch. The most notable shift in catch percentage is the large decrease in Pollock catch from 2008-2009. The catch decreases by seventy nine percent and then climbs back up to around thirty percent in the subsequent years. This sharp decrease is not paired by any other significant changes from 2008-2009 in the separator trawl data, as the other species percentages remain relatively the same. This change appears to be unique to the separator trawl as it only dropped by eight percent for pollock in the standard trawl data.

Figure 119 - Catch ratios for vessels using a standard or haddock separator trawl on Georges Bank.

	Fishing Year										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total # of Hauls and Overall Average
Standard Trawl											
# of Hauls	1,397	10,657	13,615	7,803	9,796	9,983	7,511	7,351	9,398	2,663	80,174
Haddock/Cod.	2.01	2.23	2.49	1.16	1.16	2.01	2.06	2.11	1.19	1.15	1.76
Haddock / Yellowtail Flounder	4.90	2.19	1.04	1.71	3.21	3.20	2.44	3.90	2.06	6.07	2.16
Haddock / Winter Flounder	13.39	5.59	1.74	2.17	3.48	3.19	2.56	2.16	1.14	0.54	2.41
Haddock / Total Catch.	0.15	0.15	0.09	0.07	0.11	0.14	0.11	0.12	0.08	0.05	0.11
Redfish / Cod	0.03	0.08	0.07	0.08	0.08	0.12	0.22	0.39	0.43	1.06	0.19
Redfish / Yellowtail Flounder	0.08	0.08	0.03	0.12	0.23	0.19	0.26	0.73	0.74	5.60	0.23
Redfish / Winter Flounder	0.21	0.20	0.05	0.16	0.25	0.19	0.27	0.40	0.41	0.50	0.26
Redfish / Total Catch.	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.01
Pollock / Cod	0.25	0.20	0.35	0.39	0.20	0.55	0.31	0.94	1.00	1.84	0.48
Pollock / Yellowtail Flounder	0.62	0.20	0.15	0.58	0.55	0.87	0.37	1.73	1.73	9.76	0.60
Pollock / Winter Flounder	1.70	0.50	0.25	0.74	0.59	0.87	0.39	0.96	0.96	0.87	0.66
Pollock / Total Catch.	0.02	0.01	0.01	0.03	0.02	0.04	0.02	0.05	0.06	0.08	0.03
Monkfish / Cod	2.26	1.38	2.74	1.78	0.54	0.53	0.55	0.75	0.94	2.04	1.13
Monkfish / Yellowtail Flounder	5.51	1.36	1.14	2.62	1.49	0.84	0.66	1.40	1.63	10.79	1.39
Monkfish / Winter Flounder	15.06	3.47	1.92	3.33	1.61	0.84	0.69	0.77	0.91	0.96	1.55
Monkfish / Total Catch.	0.17	0.09	0.10	0.11	0.05	0.04	0.03	0.04	0.06	0.09	0.07
Skates / Cod	5.29	6.34	12.28	6.64	5.30	7.04	8.23	7.15	5.95	8.38	7.11
Skates / Yellowtail Flounder	12.90	6.22	5.10	9.74	14.69	11.21	9.76	13.25	10.30	44.42	8.74
Skates / Winter Flounder	35.24	15.91	8.59	12.39	15.90	11.16	10.23	7.32	5.71	3.96	9.73
Skates / Total Catch.	0.41	0.43	0.45	0.43	0.49	0.48	0.46	0.41	0.38	0.35	0.44
Total Catch / Cod.	13.02	14.75	27.53	15.60	10.82	14.77	17.92	17.64	15.76	23.89	16.25
Total Catch / Yellowtail Flounder.	31.73	14.48	11.43	22.88	29.98	23.50	21.26	32.66	27.27	126.57	19.98
Total Catch / Winter Flounder.	86.72	37.00	19.27	29.12	32.44	23.40	22.27	18.04	15.11	11.27	22.24
Haddock Separator Trawl											
# of Hauls		187	356	104	57	35	588	2,041	1,181	27	4,576
Haddock/Cod.		4.02	3.96	5.08	2.60	41.06	7.34	10.11	8.26	9.61	8.49
Haddock / Yellowtail Flounder		5.90	1.71	7.55	11.35	70.43	23.28	27.83	22.24	100.22	17.00
Haddock / Winter Flounder		6.93	2.16	5.26	3.69	29.98	34.09	27.99	12.94	24.83	16.16
Haddock / Total Catch.		0.25	0.20	0.37	0.16	0.71	0.45	0.49	0.47	0.30	0.45
Redfish / Cod		0.03	0.01	0.02	0.16	0.53	0.10	0.35	0.57	6.38	0.32
Redfish / Yellowtail Flounder		0.04	0.00	0.02	0.68	0.91	0.33	0.98	1.53	66.60	0.65
Redfish / Winter Flounder		0.05	0.00	0.02	0.22	0.39	0.49	0.98	0.89	16.50	0.62
Redfish / Total Catch.		0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.20	0.02
Pollock / Cod		0.75	0.11	0.77	0.33	9.18	0.35	1.01	1.35	5.60	0.94
Pollock / Yellowtail Flounder		1.10	0.05	1.15	1.44	15.75	1.11	2.77	3.63	58.45	1.87
Pollock / Winter Flounder		1.29	0.06	0.80	0.47	6.71	1.63	2.79	2.11	14.48	1.78
Pollock / Total Catch.		0.05	0.01	0.06	0.02	0.16	0.02	0.05	0.08	0.17	0.05
Monkfish / Cod		0.70	0.98	0.26	0.19	0.64	0.19	0.14	0.29	0.92	0.27
Monkfish / Yellowtail Flounder		1.03	0.42	0.39	0.82	1.10	0.61	0.39	0.77	9.61	0.54
Monkfish / Winter Flounder		1.21	0.53	0.27	0.27	0.47	0.89	0.40	0.45	2.38	0.51
Monkfish / Total Catch.		0.04	0.05	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.01
Skates / Cod		4.77	7.79	3.55	2.38	2.12	4.75	5.54	3.42	2.98	4.91
Skates / Yellowtail Flounder		7.00	3.37	5.27	10.40	3.64	15.08	15.26	9.21	31.10	9.82
Skates / Winter Flounder		8.22	4.25	3.67	3.38	1.55	22.08	15.35	5.35	7.70	9.34
Skates / Total Catch.		0.29	0.39	0.26	0.15	0.04	0.29	0.27	0.19	0.09	0.26
Total Catch / Cod.		16.33	20.01	13.80	15.92	57.53	16.21	20.44	17.63	32.25	18.79
Total Catch / Yellowtail Flounder.		23.96	8.66	20.51	69.49	98.68	51.44	56.29	47.46	336.48	37.60
Total Catch / Winter Flounder.		28.14	10.90	14.28	22.58	42.01	75.33	56.62	27.60	83.35	35.75

Figure 120 - Observed % of each species in total catch using a standard trawl or haddock separator trawl on Georges Bank

	Fishing Year										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total # of Hauls and Average %
Standard Trawl											
# of Hauls	1,397	10,657	13,615	7,803	9,796	9,983	7,511	7,351	9,398	2,663	80,174
% of Cod in Total Catch.	7.7%	6.8%	3.6%	6.4%	9.2%	6.8%	5.6%	5.7%	6.3%	4.2%	6.2%
% of Haddock in Total Catch.	15.4%	15.1%	9.1%	7.5%	10.7%	13.6%	11.5%	11.9%	7.6%	4.8%	10.8%
% of Monkfish in Total Catch.	17.4%	9.4%	10.0%	11.4%	5.0%	3.6%	3.1%	4.3%	6.0%	8.5%	7.0%
% of Pollock in Total Catch.	2.0%	1.4%	1.3%	2.5%	1.8%	3.7%	1.7%	5.3%	6.3%	7.7%	3.0%
% of Redfish in Total Catch.	0.2%	0.5%	0.3%	0.5%	0.8%	0.8%	1.2%	2.2%	2.7%	4.4%	1.1%
% of Skates in Total Catch.	40.6%	43.0%	44.6%	42.6%	49.0%	47.7%	45.9%	40.6%	37.8%	35.1%	43.7%
% of Winter Flounder in Total Catch	1.2%	2.7%	5.2%	3.4%	3.1%	4.3%	4.5%	5.5%	6.6%	8.9%	4.5%
% of Yellowtail Flounder in Total Catch	3.2%	6.9%	8.7%	4.4%	3.3%	4.3%	4.7%	3.1%	3.7%	0.8%	5.0%
Haddock Separator Trawl											
# of Hauls		187	356	104	57	35	588	2,041	1,181	27	4,576
% of Cod in Total Catch.		6.1%	5.0%	7.2%	6.3%	1.7%	6.2%	4.9%	5.7%	3.1%	5.3%
% of Haddock in Total Catch.		24.6%	19.8%	36.8%	16.3%	71.4%	45.3%	49.4%	46.9%	29.8%	45.2%
% of Monkfish in Total Catch.		4.3%	4.9%	1.9%	1.2%	1.1%	1.2%	0.7%	1.6%	2.9%	1.4%
% of Pollock in Total Catch.		4.6%	0.6%	5.6%	2.1%	16.0%	2.2%	4.9%	7.7%	17.4%	5.0%
% of Redfish in Total Catch.		0.2%	0.0%	0.1%	1.0%	0.9%	0.6%	1.7%	3.2%	19.8%	1.7%
% of Skates in Total Catch.		29.2%	38.9%	25.7%	15.0%	3.7%	29.3%	27.1%	19.4%	9.2%	26.1%
% of Winter Flounder in Total Catch		3.6%	9.2%	7.0%	4.4%	2.4%	1.3%	1.8%	3.6%	1.2%	2.8%
% of Yellowtail Flounder in Total Catch		4.2%	11.6%	4.9%	1.4%	1.0%	1.9%	1.8%	2.1%	0.3%	2.7%

Figure 121 - Graph of ratios of observed target species catch to other species catch using a standard or haddock separator trawl on Georges Bank.

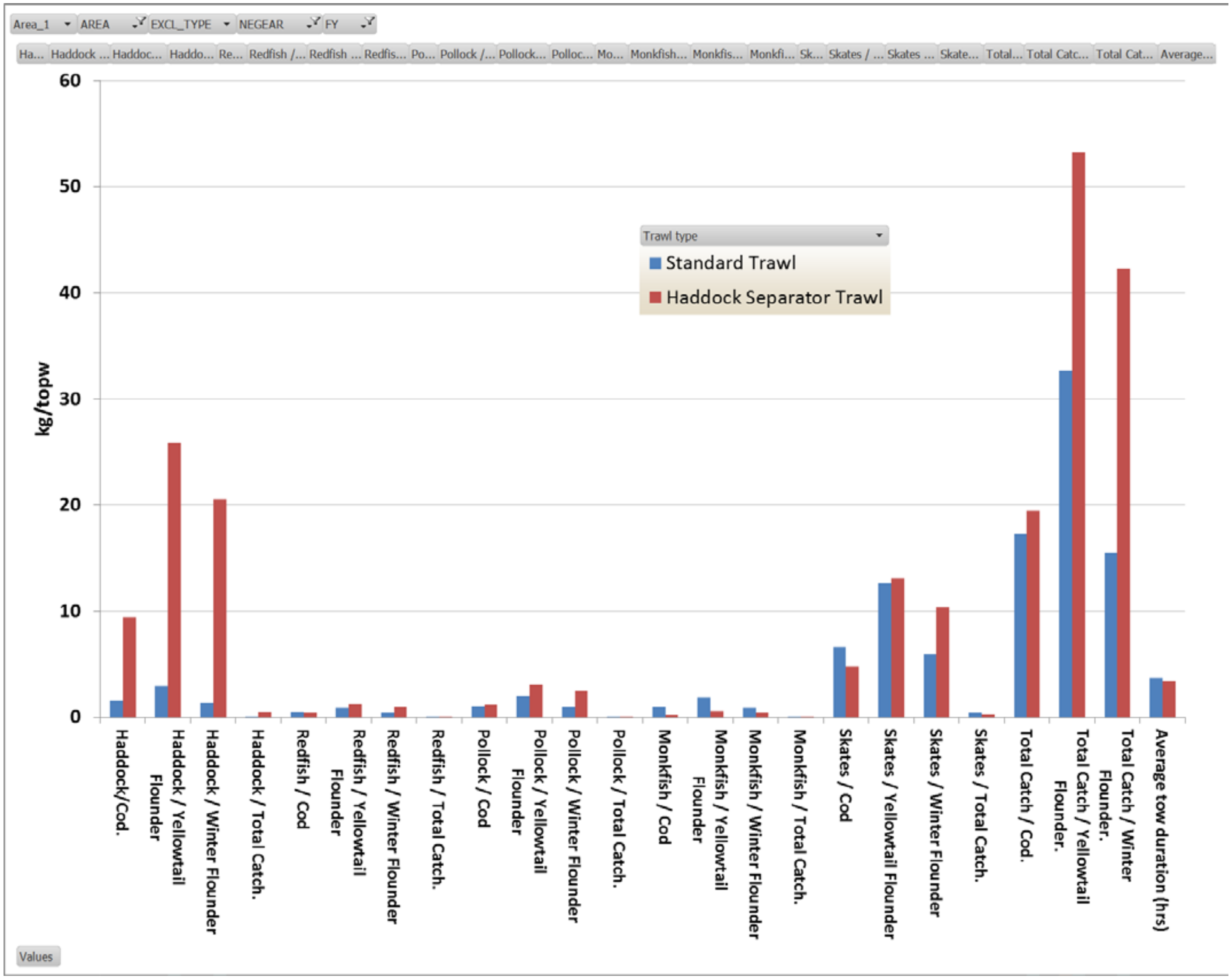


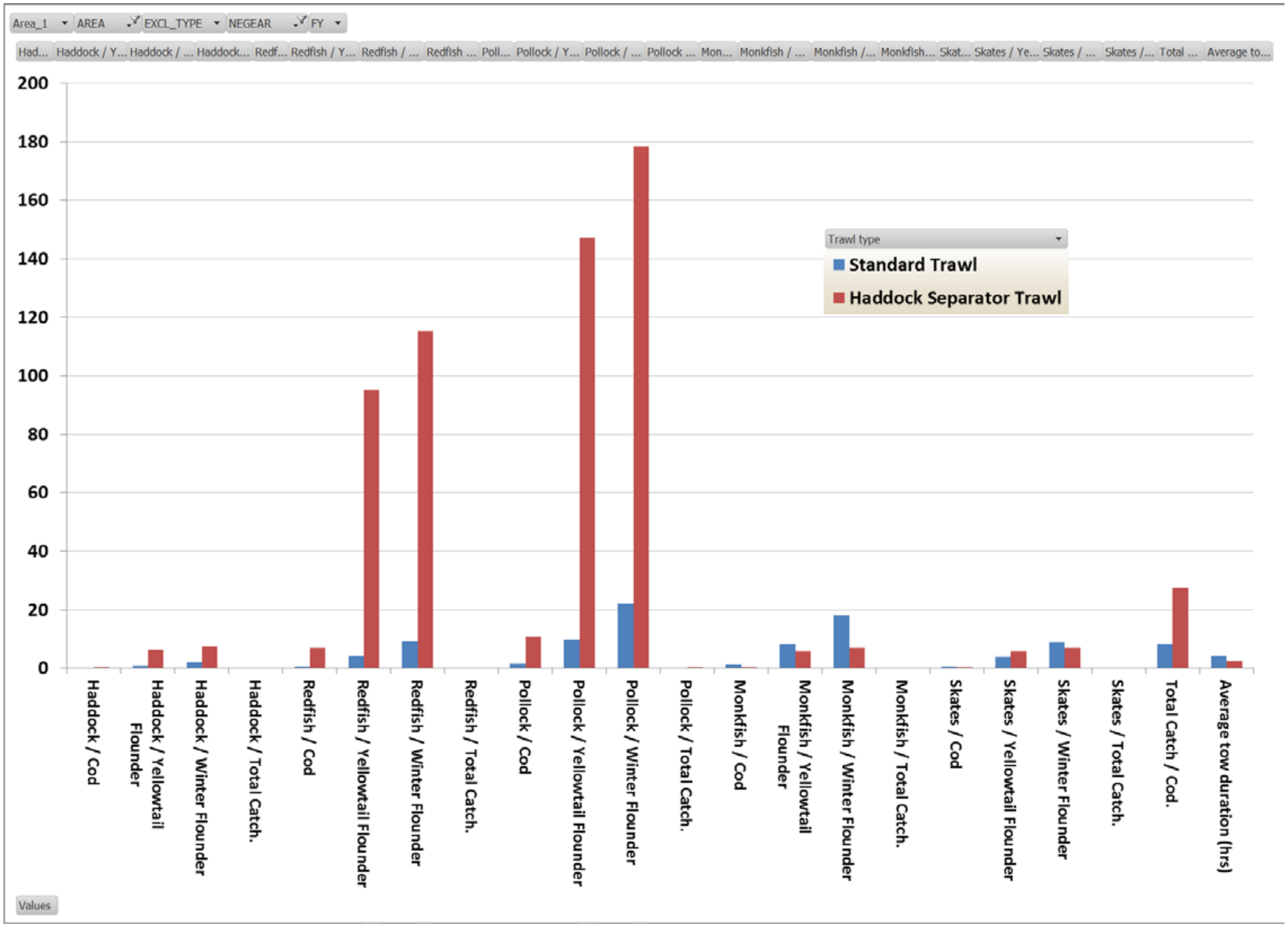
Table 64 - Catch ratios for vessels using a standard or haddock separator trawl in The Gulf of Maine.

	Fishing Year										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total # of Hauls and Overall Average
Standard Trawl											
# of Hauls	373	2,148	2,595	754	1,625	1,893	1,836	4,863	7,073	2,010	25,170
Haddock / Cod	0.62	0.40	0.30	0.43	0.23	0.18	0.17	0.14	0.09	0.16	0.16
Haddock / Yellowtail Flounder	2.43	1.04	0.60	1.41	1.12	0.84	1.28	1.18	0.94	0.38	0.94
Haddock / Winter Flounder	3.49	1.34	1.08	1.55	1.31	1.80	2.78	5.14	2.65	1.14	2.09
Haddock / Total Catch.	0.04	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.02
Redfish / Cod	0.18	0.32	0.25	1.19	1.37	0.88	0.58	0.52	0.63	2.85	0.69
Redfish / Yellowtail Flounder	0.70	0.82	0.51	3.91	6.85	4.15	4.39	4.38	6.45	6.89	4.12
Redfish / Winter Flounder	1.01	1.06	0.92	4.29	7.95	8.87	9.56	19.09	18.12	20.84	9.12
Redfish / Total Catch.	0.01	0.02	0.02	0.06	0.07	0.09	0.07	0.09	0.10	0.18	0.08
Pollock / Cod	1.51	3.00	1.89	6.06	6.15	3.02	2.07	0.86	1.09	3.59	1.66
Pollock / Yellowtail Flounder	5.90	7.85	3.82	19.94	30.65	14.30	15.59	7.28	11.20	8.68	9.99
Pollock / Winter Flounder	8.50	10.06	6.90	21.89	35.57	30.53	33.95	31.74	31.48	26.25	22.12
Pollock / Total Catch.	0.09	0.18	0.15	0.28	0.33	0.32	0.24	0.15	0.17	0.22	0.20
Monkfish / Cod	7.04	4.85	2.53	3.80	3.41	1.26	1.29	0.82	0.88	1.43	1.36
Monkfish / Yellowtail Flounder	27.45	12.68	5.13	12.48	17.00	5.96	9.72	6.98	8.96	3.45	8.19
Monkfish / Winter Flounder	39.53	16.27	9.25	13.70	19.73	12.71	21.17	30.42	25.20	10.43	18.13
Monkfish / Total Catch.	0.44	0.29	0.20	0.18	0.18	0.13	0.15	0.14	0.14	0.09	0.16
Skates / Cod	0.60	1.18	1.35	2.65	1.08	0.56	0.67	0.45	0.55	1.15	0.66
Skates / Yellowtail Flounder	2.35	3.09	2.73	8.70	5.38	2.64	5.02	3.80	5.60	2.78	4.00
Skates / Winter Flounder	3.39	3.96	4.92	9.55	6.24	5.63	10.93	16.56	15.76	8.40	8.85
Skates / Total Catch.	0.04	0.07	0.11	0.12	0.06	0.06	0.08	0.08	0.09	0.07	0.08
Total Catch / Cod.	16.11	16.90	12.47	21.45	18.73	9.36	8.52	5.87	6.32	15.96	8.35
Total Catch / Yellowtail Flounder.	62.81	44.18	25.27	70.53	93.31	44.28	64.06	49.81	64.64	38.64	50.16
Total Catch / Winter Flounder.	90.46	56.67	45.60	77.43	108.29	94.52	139.54	217.03	181.73	116.80	111.08
Haddock Separator Trawl											
# of Hauls		29	1	24	64	37	40	347	261	18	821
Haddock / Cod		2.37	0.70	1.02	1.12	0.09	0.45	0.88	0.24	7.51	0.46
Haddock / Yellowtail Flounder		7.83		23.50	16.66	2.99	5.50	6.61	4.93	1004.43	6.25
Haddock / Winter Flounder		2.04		12.39	10.10	5.38	8.17	5.61	13.64	143.49	7.57
Haddock / Total Catch.		0.00	0.07	0.01	0.01	0.00	0.04	0.02	0.02	0.07	0.02
Redfish / Cod		0.09	1.16	9.21	6.08	1.81	0.70	15.93	4.61	27.28	7.02
Redfish / Yellowtail Flounder		0.29		211.62	90.29	59.34	8.65	119.02	93.45	3650.10	95.23
Redfish / Winter Flounder		0.07		111.58	54.74	106.89	12.84	100.99	258.75	521.44	115.27
Redfish / Total Catch.		0.00	0.12	0.06	0.05	0.04	0.06	0.37	0.29	0.25	0.25
Pollock / Cod		0.15	4.95	137.21	93.51	43.79	0.73	12.31	5.51	37.03	10.86
Pollock / Yellowtail Flounder		0.49		3152.23	1389.04	1433.89	9.07	91.97	111.69	4955.48	147.26
Pollock / Winter Flounder		0.13		1662.09	842.09	2582.88	13.47	78.04	309.27	707.93	178.25
Pollock / Total Catch.		0.00	0.50	0.86	0.78	0.86	0.06	0.29	0.35	0.34	0.39
Monkfish / Cod		1.21	0.50	3.54	1.26	0.26	0.10	0.96	0.19	4.00	0.43
Monkfish / Yellowtail Flounder		4.00		81.38	18.68	8.55	1.23	7.20	3.86	534.80	5.87
Monkfish / Winter Flounder		1.04		42.91	11.33	15.41	1.82	6.11	10.69	76.40	7.10
Monkfish / Total Catch.		0.00	0.05	0.02	0.01	0.01	0.01	0.02	0.01	0.04	0.02
Skates / Cod		0.11	0.05	0.31	0.32	0.07	0.11	0.94	0.29	2.24	0.43
Skates / Yellowtail Flounder		0.36		7.18	4.82	2.15	1.31	7.04	5.88	299.70	5.82
Skates / Winter Flounder		0.09		3.79	2.92	3.88	1.94	5.97	16.27	42.81	7.05
Skates / Total Catch.		0.00	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02
Total Catch / Cod.		522.05	9.83	160.42	119.77	50.97	11.83	43.13	15.79	108.82	27.55
Total Catch / Yellowtail Flounder.		1724.36		3685.53	1779.08	1669.10	146.18	322.27	319.88	14563.04	373.51
Total Catch / Winter Flounder.		448.77		1943.28	1078.54	3006.58	217.07	273.45	885.74	2080.43	452.12

Table 65 - Observed % of each species in total catch using a standard trawl or haddock separator trawl in The Gulf of Maine

	Fishing Year 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total # of Hauls and Average %
Standard Trawl											
# of Hauls	373	2,148	2,595	754	1,625	1,893	1,836	4,863	7,073	2,010	25,170
% of Cod in Total Catch.	6.2%	5.9%	8.0%	4.7%	5.3%	10.7%	11.7%	17.0%	15.8%	6.3%	12.0%
% of Haddock in Total Catch.	3.9%	2.4%	2.4%	2.0%	1.2%	1.9%	2.0%	2.4%	1.5%	1.0%	1.9%
% of Monkfish in Total Catch.	43.7%	28.7%	20.3%	17.7%	18.2%	13.5%	15.2%	14.0%	13.9%	8.9%	16.3%
% of Pollock in Total Catch.	9.4%	17.8%	15.1%	28.3%	32.8%	32.3%	24.3%	14.6%	17.3%	22.5%	19.9%
% of Redfish in Total Catch.	1.1%	1.9%	2.0%	5.5%	7.3%	9.4%	6.8%	8.8%	10.0%	17.8%	8.2%
% of Skates in Total Catch.	3.7%	7.0%	10.8%	12.3%	5.8%	6.0%	7.8%	7.6%	8.7%	7.2%	8.0%
% of Winter Flounder in Total Catch	1.1%	1.8%	2.2%	1.3%	0.9%	1.1%	0.7%	0.5%	0.6%	0.9%	0.9%
% of Yellowtail Flounder in Total Catch	1.6%	2.3%	4.0%	1.4%	1.1%	2.3%	1.6%	2.0%	1.5%	2.6%	2.0%
Haddock Separator Trawl											
# of Hauls		29	1	24	64	37	40	347	261	18	821
% of Cod in Total Catch.		0.2%	10.2%	0.6%	0.8%	2.0%	8.5%	2.3%	6.3%	0.9%	3.6%
% of Haddock in Total Catch.		0.5%	7.1%	0.6%	0.9%	0.2%	3.8%	2.1%	1.5%	6.9%	1.7%
% of Monkfish in Total Catch.		0.2%	5.1%	2.2%	1.1%	0.5%	0.8%	2.2%	1.2%	3.7%	1.6%
% of Pollock in Total Catch.		0.0%	50.3%	85.5%	78.1%	85.9%	6.2%	28.5%	34.9%	34.0%	39.4%
% of Redfish in Total Catch.		0.0%	11.8%	5.7%	5.1%	3.6%	5.9%	36.9%	29.2%	25.1%	25.5%
% of Skates in Total Catch.		0.0%	0.5%	0.2%	0.3%	0.1%	0.9%	2.2%	1.8%	2.1%	1.6%
% of Winter Flounder in Total Catch		0.2%	0.0%	0.1%	0.1%	0.0%	0.5%	0.4%	0.1%	0.0%	0.2%
% of Yellowtail Flounder in Total Catch		0.1%	0.0%	0.0%	0.1%	0.1%	0.7%	0.3%	0.3%	0.0%	0.3%

Figure 122 - Graph of ratios of observed target species catch to other species catch using a standard or haddock separator trawl in The Gulf of Maine.



The average catch per tow of each species specifically within Statistical Areas 525 and 562 are shown in Figure 123. Statistical areas 525 and 562 were chosen to provide a comparison of hauls inside and outside Closed Area II. Those areas were also specifically chosen to represent hauls around the southern portion of Closed Area II due to those areas' ability to provide comparable data inside and outside Closed Area II. The evaluated period in Figure 123 was reduced to 2010-2012 in order to focus on the most recent data available. The side-by-side comparison of catch per tow by trawl type is given in Figure 123 and allows for a simple comparison of trawl effectiveness. The amounts do not vary greatly for most species, though the largest differences occur for Haddock and Skates. As expected, the haddock separator trawl consistently reports higher Haddock catch totals than the standard trawl, with the largest differences occurring in 2010 both inside and outside Closed Area II. The standard trawl reports higher catch amounts of Skates each year, both inside and outside Closed Area II. The Total Catch/tow is consistently higher with the standard trawl than the separator trawl, with the largest difference between the two occurring inside Closed Area II in 2012. This occurs despite the very low number of standard trawl hauls occurring inside Closed Area II compared to haddock separator hauls. The haul durations do not vary greatly between trawl types, though minor shifts do occur. An example of this is the fact that on average, separator trawl hauls were longer in 2010 and standard trawl hauls were longer in 2011.

There are more observed hauls that occurred outside of the closed area than inside each year, though the hauls inside the closed area were longer on average. The catch/tow of each species remained relatively consistent over the evaluated time period, though some notable shifts occurred for haddock and skates. The total number of separator trawl tows decreased in 2011, leading to the catch/tow of both haddock and skates decreasing by about five hundred pounds from 2010 to 2011. There were about five hundred more tows with the standard trawl in 2011 than in 2010 yet the catch/tow amounts did not change significantly. The overall total catch/tow of standard trawls is much higher in 2012 than in previous years. Due to the much lower number of observed tows, this is more representative of the success of these fewer tows that occurred before September 2012. The organization of data in the table also allows for a comparison of catch per tow inside and outside Closed Area II. The overall total catch/tow is higher outside the closed area than inside in 2011 and 2012. The overall total catch/tow amounts in 2010, however, are very similar both inside and outside the closed area. Haddock, yellowtail flounder and skates make up most of the catch on observed standard trawl tows inside the closed area in 2010. The catch/tow of each of those species on observed standard trawl tows is also higher inside the closed area than outside in 2010. On average, hauls were longer inside the closed area than outside.

The comparison of separator trawl catch per tow inside and outside the closed area is shown in Figure 124. The numerator is the catch per tow of that particular species inside Closed Area II and the denominator is the catch per tow of that particular species outside Closed Area II. To clarify, the cod/tow ratio of 0.35 indicates that there are 0.35 lbs. of cod caught per tow inside Closed Area II for every one lb. of cod caught per tow outside Closed Area II. This allows for an easy way to compare catch per tow inside and outside the closed area. The separator trawl ratios for inside/outside result in some interesting observations. The haddock/tow and monkfish/tow ratios decrease from 2010 to 2011. The change from 1.04 in 2010 to 0.81 in 2011 could indicate that now a greater amount of haddock and monkfish are caught per tow outside the closed area than inside. Not every species underwent this same change, as the greater catch per tow of skates shifted to inside the closed area in 2011. The cod/tow, winter flounder/tow and redfish/tow ratios do not fluctuate as significantly, showing a greater amount of cod being caught per tow outside the closed area in both years.

The comparison of separator trawl catch per tow and standard trawl catch per tow is shown in Figure 125. These ratios were made using the observed tows that occurred outside Closed Area II. The separator trawl catch per tow is the numerator and the standard trawl catch per tow is the denominator. The listed cod/tow ratio of 1.99 indicates that there are 1.99 lbs. of cod caught per tow using the separator trawl for every one lb. of cod caught per tow using the standard trawl. This allows for a simple comparison of trawl performance outside the closed area. The ratios indicate some notable changes between 2010 and 2011, the most obvious of which being the great increase in cod per tow for the separator trawl in 2011. This increase shows the superior effectiveness of the separator trawl in catching cod outside Closed Area II in 2011. The other ratios remain relatively stable with the only exception being a shift toward equal performances between gear types for pollock/tow in 2011. The ratios of Total Catch/tow between gear types indicate a higher catch per tow for the standard trawl.

Figure 123 - Average catch per tow inside and outside Closed Area II

Fishing Year	2010 Standard Trawl	2010 Haddock Separator Trawl	2011 Standard Trawl	2011 Haddock Separator Trawl	2012 Standard Trawl	2012 Haddock Separator Trawl	Overall Average/Grand Total
Inside Closed Area II							
Cod/tow	5	19	70	8	14	4	14
Haddock/tow	324	1,581	501	855	286	299	1,193
Yellowtail flounder/tow	245	56	18	38	13	8	49
Winter Flounder/tow	16	33	33	12	107	24	24
Redfish/tow	0	0	34	0	0	0	0
Monkfish/tow	12	7	30	2	27	3	5
Pollock/tow	0	1	15	1	3	0	1
Skates/tow	2,207	829	721	323	1,035	91	616
Total Catch/tow	3,148	2,599	1,675	1,304	2,000	490	1,984
Total Discards/tow	2,684	884	618	380	1,446	121	680
Total Observed Tows.	5	161	4	137	3	7	317
Average Haul Duration	3.10	3.66	4.13	3.62	4.93	2.79	3.63
Standard Dev. of Haul Duration	1.31	1.24	1.24	0.79	1.10	1.24	1.08
Outside Closed Area II							
Cod/tow	27	54	3	80	3		22
Haddock/tow	156	1,523	109	1,051	286		457
Yellowtail flounder/tow	221	48	367	65	341		255
Winter Flounder/tow	235	38	158	42	97		143
Redfish/tow	0	0	0	0	0		0
Monkfish/tow	33	5	79	3	17		49
Pollock/tow	0	1	0	0	0		0
Skates/tow	1,424	862	1,644	312	2,807		1,408
Total Catch/tow	3,141	2,642	3,098	1,688	5,797		3,015
Total Discards/tow	1,946	939	1,911	447	3,926		1,701
Total Observed Tows.	416	392	966	86	46		1906
Average Haul Duration	2.89	3.36	2.95	2.90	2.86		3.01
Standard Dev. of Haul Duration	1.01	0.97	0.80	0.98	0.93		0.91

Figure 124 - Ratios of observed separator trawl catch per tow inside and outside of Closed Area II

Separator Trawl catch per tow	2010	2011
Inside Closed Area / Outside Closed Area		
Cod/tow	0.35	0.09
Haddock/tow	1.04	0.81
Yellowtail flounder/tow	1.16	0.58
Winter Flounder/tow	0.87	0.28
Redfish/tow	0.05	0.31
Monkfish/tow	1.47	0.73
Pollock/tow	1.43	9.78
Skates/tow	0.96	1.03
Total Catch/tow	0.98	0.77
Total Discards/tow	0.94	0.85
Total Observed Tows.	0.41	1.59
Average Haul Duration	1.09	1.25
Standard Dev. of Haul Duration	1.28	0.80

Figure 125 - Ratios of trawl catch per tow outside Closed Area II

Separator Trawl catch per tow / Standard Trawl catch per tow	2010	2011
Outside Closed Area II		
Cod/tow	1.99	25.23
Haddock/tow	9.79	9.62
Yellowtail flounder/tow	0.22	0.18
Winter Flounder/tow	0.16	0.27
Redfish/tow	1.95	1.31
Monkfish/tow	0.15	0.04
Pollock/tow	7.19	1.06
Skates/tow	0.61	0.19
Total Catch/tow	0.84	0.54
Total Discards/tow	0.48	0.23
Total Observed Tows.	0.94	0.09
Average Haul Duration	1.16	0.98
Standard Dev. of Haul Duration	0.96	1.22

6.6.4.3 Gillnet and Hook gear performance

The annual VTR data is summarized in Figure 126 for all trips that used gillnets or hook gears on Georges Bank. The total number of vessels and trips had remained relatively consistent until the large increase in trips in 2011. The total reported hauls has shown a few increases and decreases and is reflected in the total landings data. Aside from the decrease in total landings in 2010, the total reported landings in recent years have increased. This could indicate that vessels are focusing more of their fishing effort in Georges Bank with gillnets and hook gears. The annual VTR data summarized in Figure 127 pertains to all trips that used gillnets or hook gears in The Gulf of Maine. The amount of fishing effort was steadily increasing over the evaluated time period until 2010, when the amount of fishing effort sharply decreased. This is reflected in a sharp decrease of the total number of vessels, trips, reported hauls and reported landings. This large decrease in fishing effort could indicate that there will be less fishing effort with gillnets and hook gears in The Gulf of Maine in the future.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using gillnets on Georges Bank are shown in Figure 128. The species were ranked in Figure 128 so as to reflect their ranking in total catch specifically from 2009-2011. The five most-caught species from 2009-2011 were winter skate, spiny dogfish, pollock, cod, and monkfish. Analyzing the entire evaluated period, the five most-caught species were winter skate, spiny dogfish, monkfish, cod and pollock. Comparing the entire evaluated period rankings to the 2009-2011 rankings, monkfish moved down and pollock moved up. Winter skate and spiny dogfish remained the two most-caught species in both rankings. The years with the highest number of observed hauls and therefore the highest total catches are 2010 and 2011. Winter skate and spiny dogfish make up the vast majority of the total catches each year, with winter skate comprising over half of the overall total catch. The large increase in the number of observed hauls in 2010 reflects the increased sampling from the at-sea monitoring program.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using gillnets in The Gulf of Maine are shown in Figure 129. The species were ranked in Figure 129 so as to reflect their ranking in total catch specifically from 2009-2011. The five most-caught species from 2009-2011 were Spiny dogfish, pollock, cod, white hake and winter skate. Analyzing the entire evaluated period, the five most-caught species were spiny dogfish, pollock, cod, monkfish and white hake. Comparing the entire evaluated period rankings to the 2009-2011 rankings, there are not many changes. Spiny dogfish, pollock and cod remain the three most-caught species, while monkfish moved down and white hake and winter skate moved up. The years with the highest number of observed hauls and therefore the highest total catches are 2010 and 2011. Spiny dogfish, pollock and cod make up almost the entire total catch during these years as well. The large increase in the number of observed hauls in 2010 and 2011 reflects the increased sampling from the at-sea monitoring program.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using hook gears on Georges Bank are shown in Figure 130. The species were ranked in Figure 130 so as to reflect their ranking in total catch specifically from 2009-2011. The five most-caught species from 2009-2011 were haddock, spiny dogfish, cod, winter skate and little skate. Analyzing the entire evaluated period, the five most-caught species were haddock, spiny dogfish, cod, winter skate and white hake. The rankings barely changed between the two evaluated periods, except in 2009-2011 little skate moved up while white hake moved down. The year with the highest number of observed hauls and therefore the highest total catch is 2005. The total catch in 2005 was made up almost entirely of haddock. The observed catch of winter skate exceeds the observed catch of white hake in 2009-2011 by a wide margin.

Total catches (kept and discarded) of the top twenty-five species on observed hauls using hook gears in The Gulf of Maine are shown in Figure 131. The species were ranked in Figure 131 so as to reflect their ranking in total catch specifically from 2009-2011. The same five species ranked highest when the period of 2009-2011 was compared to the entire evaluated period. These top species are cod, spiny dogfish, haddock, thorny skate and little skate. The lack of a change in the rankings indicates that the catch composition for vessels using hook gears in The Gulf of Maine has remained consistent.

Figure 126 - Annual VTR data for trips using gillnets and hook gears in Georges Bank. (Statistical Areas 521, 522, 525, 526, 561 and 562)

Gillnets and Hook Gears	Fishing Year 2004	2005	2006	2007	2008	2009	2010	2011	2012
Total vessels	155	153	144	143	139	145	133	143	102
Total trips	3,489	3,912	3,402	4,024	3,681	3,388	3,527	4,571	2,485
Total reported hauls	52,387	58,620	42,810	56,908	58,953	50,169	43,138	61,475	23,799
Total reported landings (lbs.)	10,008,825	11,024,953	10,236,913	14,157,476	13,732,407	13,574,926	10,553,961	14,279,717	7,238,632

Figure 127 - Annual VTR data for trips using gillnets and hook gears in The Gulf of Maine. (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

Gillnets and Hook Gears	Fishing Year 2004	2005	2006	2007	2008	2009	2010	2011	2012
Total vessels	193	181	172	155	159	160	140	111	88
Total trips	5,970	6,203	6,633	7,480	8,609	9,941	5,157	5,955	2,557
Total reported hauls	123,870	124,195	110,974	96,553	102,906	102,090	74,212	104,498	56,935
Total reported landings (lbs.)	12,619,361	11,729,380	11,903,480	13,241,965	16,110,094	17,179,102	11,529,186	12,696,895	6,207,701

Figure 128 - Catch (lbs.) on observed hauls using gillnets on Georges Bank. (Statistical Areas 521, 522, 525, 526, 561 and 562)

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gillnet									
# of Hauls	845	780	184	618	324	232	1,509	1,249	839
Total Catch.	1,032,423	841,842	279,375	1,038,863	728,922	364,401	2,712,818	2,634,128	1,553,265
Total Discards	239,374	171,177	86,222	180,050	144,614	117,824	396,402	322,257	144,080
Winter Skate.	499,351	395,188	148,395	739,654	472,334	103,090	1,756,148	1,673,318	892,766
Spiny Dogfish.	164,315	131,464	63,336	88,752	108,372	101,345	392,571	506,795	472,294
Pollock.	26,725	56,738	6,454	19,656	34,620	44,356	127,508	130,252	34,582
Cod.	68,725	58,512	17,418	34,766	39,863	43,644	128,287	96,658	50,506
Monkfish.	134,710	116,219	18,969	52,898	13,481	9,036	82,536	64,187	26,047
White Hake.	3,151	5,283	1,287	2,129	1,629	35,196	31,613	56,465	22,131
Barndoor Skate.	13,695	1,481	1,575	9,239	1,378	3,760	31,200	20,648	13,015
Lobster.	20,983	19,343	4,477	13,356	5,463	6,876	24,890	15,960	8,037
Haddock.	7,223	2,059	602	723	832	2,721	18,011	2,955	4,051
Little Skate.	16,444	1,675	2,606	5,128	2,141	1,431	10,548	9,552	8,884
Redfish.	538	5,115	13	12,629	6,390	1,284	3,098	7,763	1,372
Red Hake.	167	109	21	34	175	600	3,128	1,624	2,744
Bluefish.	3,911	3,337	368	6,521	1,119	266	4,130	886	2,126
Winter Flounder.	5,904	2,173	698	2,516	800	205	3,168	1,479	1,114
Plaice.	72	85	71	21	46	53	241	3,274	17
Black Sea Bass	308	111	64	881	179	36	2,213	1,203	599
Offshore Hake.	38	31	0	4	2	332	1,579	884	1,888
Silver Hake.	117	78	21	28	173	268	1,401	725	849
Thorny Skate.	1,166	517	130	164	87	123	1,203	886	260
Smooth Skate.	61	257	63	54	54	274	771	1,086	203
Wolffish.	421	584	78	176	66	142	1,166	664	364
Sea Scallop.	128	218	48	157	74	402	904	141	57
Halibut.	171	125	66	111	18	13	533	285	243
Yellowtail Flounder.	4,412	481	128	1,137	497	113	343	249	27
Striped Bass.	1,272	84	295	478	205	132	251	310	74
Windowpane Flounder.	2	10	5	32	11	13	210	99	76
Witch Flounder.	84	67	5	11	34	12	181	116	31
Mackerel.	1,238	197	50	116	19	37	167	38	30
Clearnose Skate.	15	7	2	69	0	145	13	75	0
Herring.	8	55	1	1	2	5	69	39	74
Fourspot Flounder.	51	3	6	1	6	2	87	11	4
Tilefish.	19	0	15	0	0	0	42	51	5
Red Crab.	0	66	5	0	0	1	14	10	0
Butterfish.	3	0	0	0	0	0	14	0	0
Ocean Pout.	113	10	20	98	21	6	4	3	0
Blueback Herring	405	0	0	0	0	1	4	6	12
Rosette Skate.	4	9	0	15	0	0	6	2	0
Alewife.	0	0	0	0	0	0	6	0	0
Tautog.	19	2	0	8	0	0	2	0	0
Illex Squid	0	0	0	0	0	0	0	2	0
Loligo Squid	0	0	0	0	0	0	0	1	0
Scup.	0	0	0	0	0	0	1	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

Figure 129 - Catch (lbs.) on observed hauls using gillnets in The Gulf of Maine (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

	Fishing Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gillnet									
# of Tows	2,994	2,463	402	538	940	546	5,391	6,331	3,094
Total Catch.	1,893,506	1,850,628	474,222	547,893	759,830	605,617	5,203,010	5,126,808	2,791,852
Total Discards	694,601	565,247	156,625	164,157	183,680	173,217	1,165,674	1,308,638	764,665
Spiny Dogfish.	646,826	525,964	149,406	137,288	196,831	236,994	1,475,487	1,951,681	1,512,112
Pollock.	255,041	452,261	200,410	263,043	267,424	170,698	1,164,983	1,191,403	451,414
Cod.	467,191	341,639	49,244	60,336	150,428	130,091	1,280,689	878,789	301,402
White Hake.	96,051	95,362	22,654	16,909	33,501	16,356	230,852	316,025	209,723
Winter Skate.	7,864	12,133	1,455	928	22,460	2,195	364,108	131,962	9,895
Monkfish.	207,592	255,859	17,292	32,334	22,091	17,253	186,748	197,118	83,694
Lobster.	43,629	56,944	4,716	7,701	11,792	7,028	96,303	106,076	63,392
Yellowtail Flounder.	37,999	8,803	2,981	2,070	9,978	5,111	98,423	94,273	36,005
Redfish.	6,754	9,951	6,562	8,453	10,081	3,828	37,190	22,314	4,541
Little Skate.	7,230	2,504	1,307	1,820	990	1,257	30,258	30,847	2,681
Haddock.	12,752	9,496	2,450	2,054	10,464	1,099	35,706	24,240	7,619
Winter Flounder.	25,724	14,124	1,516	3,845	2,516	1,547	17,196	30,091	10,480
Red Hake.	3,816	468	3,613	259	5,120	1,674	18,092	18,878	17,388
Thorny Skate.	7,557	11,570	911	1,577	2,260	2,070	15,028	19,639	9,365
Offshore Hake.	3,053	158	3,563	12	4,513	1,034	12,239	8,118	3,506
Bluefish.	14,155	5,582	263	639	1,257	828	11,183	9,252	11,226
Silver Hake.	756	292	50	247	573	633	5,728	10,671	13,805
Barndoor Skate.	324	1,397	57	258	114	507	4,056	9,279	4,728
Plaice.	2,675	757	105	349	987	237	5,963	5,409	5,759
Witch Flounder.	2,766	2,197	98	538	261	676	7,111	3,719	3,490
Smooth Skate.	345	429	499	328	486	324	3,298	4,105	1,622
Halibut.	293	712	180	231	230	113	2,454	3,491	2,635
Striped Bass.	980	1,052	25	175	117	42	2,284	2,784	1,518
Herring.	453	2,857	76	255	568	97	2,087	2,164	2,370
Wolffish.	2,092	2,030	143	242	296	149	1,194	1,959	1,403
Mackerel.	2,210	685	17	7	109	107	1,089	1,656	1,797
Windowpane Flounder.	25	23	2	12	76	13	375	818	127
Fourspot Flounder.	146	62	2	17	13	25	236	224	401
Clearnose Skate.	166	89	34	47	129	0	274	47	0
Ocean Pout.	254	128	18	18	39	18	143	133	36
Sea Scallop.	130	24	0	2	0	1	171	107	313
Black Sea Bass	44	46	4	4	62	2	74	179	77
Red Crab.	42	203	6	3	29	5	90	100	18
Butterfish.	0	1	0	0	0	0	137	16	15
Rosette Skate.	4	8	0	0	3	2	45	45	0
Alewife.	9	7	0	0	0	0	5	62	0
Blueback Herring	44	69	0	1	0	0	57	0	123
Tilefish.	0	0	0	0	0	0	24	0	0
Tautog.	7	6	4	0	0	0	7	6	37
Illex Squid	0	0	0	0	0	1	3	2	0
Scup.	0	0	0	0	5	0	0	0	2
Southern Flounder.	0	2	0	0	0	0	0	0	0
Loligo Squid	0	0	0	1	0	0	0	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0

Figure 130 - Catch (lbs.) on observed hauls using hook gears on Georges Bank. (Statistical Areas 521, 522, 525, 526, 561 and 562)

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Hook and Line									
# of Hauls	607	1,191	398	270	463	450	826	424	364
Total Catch.	819,849	969,834	418,890	318,469	391,232	465,262	615,562	185,104	349,327
Total Discards	251,949	199,853	261,472	141,981	93,921	168,069	137,779	38,575	17,997
Haddock.	523,951	692,057	161,724	169,175	270,162	219,460	227,479	19,552	903
Spiny Dogfish.	233,636	95,010	209,146	121,072	43,713	122,046	202,489	113,952	340,852
Cod.	27,987	69,828	22,002	12,115	35,906	59,751	58,396	23,872	3,943
Winter Skate.	991	10,841	2,222	782	17,436	29,144	42,483	10,530	1,293
Little Skate.	501	17,635	1,559	289	2,322	6,693	7,086	2,528	817
Barndoor Skate.	323	9,378	3,567	4,604	1,069	2,039	11,933	1,253	1
Bluefish.	0	12	0	0	6	10	11,138	1,261	16
White Hake.	8,833	17,079	4,324	2,007	6,130	1,409	6,753	926	0
Thorny Skate.	2,321	2,664	1,294	2,029	2,599	1,109	5,118	732	0
Pollock.	416	538	26	57	12	24	2,928	3,336	471
Red Hake.	1,246	2,856	559	1,028	1,971	1,374	4,262	60	14
Offshore Hake.	1,246	2,566	559	1,024	1,971	1,374	4,255	59	14
Ocean Pout.	98	1,766	139	51	426	596	701	908	2
Redfish.	2,573	6,072	283	1,015	1,850	444	1,672	88	0
Winter Flounder.	61	404	66	49	257	346	395	225	10
Smooth Skate.	110	93	17	170	47	39	422	45	0
Monkfish.	2,138	2,488	810	347	147	103	320	65	0
Sea Scallop.	0	46	20	0	12	31	409	38	5
Wolffish.	326	585	37	72	35	7	231	164	0
Halibut.	306	588	148	80	74	79	161	17	0
Yellowtail Flounder.	1	60	5	1	7	68	62	9	2
Striped Bass.	0	0	60	0	19	0	97	15	116
Lobster.	12	63	0	9	20	68	9	20	2
Plaice.	17	53	7	3	3	4	69	7	0
Black Sea Bass	0	3	0	0	0	0	24	0	0
Windowpane Flounder.	0	1	0	0	0	7	0	1	0
Silver Hake.	0	290	0	4	0	0	5	1	0
Clearnose Skate.	102	0	0	0	0	0	2	0	0
Rosette Skate.	0	0	0	0	0	0	1	0	0
Tilefish.	0	114	0	0	0	0	0	0	0
Tautog.	50	21	27	0	0	0	0	0	0
Mackerel.	9	0	0	0	0	0	0	0	0
Herring.	0	7	0	0	1	0	0	0	0
Scup.	0	5	0	0	0	0	0	0	0
Witch Flounder.	0	1	0	0	0	0	0	0	0
Loligo Squid	0	0	0	0	0	0	0	0	0
Fourspot Flounder.	0	0	0	0	0	0	0	0	0
Illex Squid	0	0	0	0	0	0	0	0	0
Alewife.	0	0	0	0	0	0	0	0	0
Butterfish.	0	0	0	0	0	0	0	0	0
Blueback Herring	0	0	0	0	0	0	0	0	0
Red Crab.	0	0	0	0	0	0	0	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

Figure 131. Catch (lbs.) on observed hauls using hook gears in The Gulf of Maine. (Statistical Areas 464, 465, 511, 512, 513, 514, and 515)

	Fishing Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Hook and Line									
# of Hauls	160	178	81	88	82	121	650	598	180
Total Catch.	49,374	72,852	32,355	73,077	33,192	60,913	152,266	188,998	63,113
Total Discards	11,961	20,009	9,689	40,590	10,865	14,706	35,671	32,272	7,186
Cod.	26,348	27,264	11,128	13,648	14,044	24,678	83,831	90,566	9,731
Spiny Dogfish.	426	11,998	11,168	41,043	11,727	28,220	32,893	48,741	40,589
Haddock.	16,396	24,357	6,781	4,366	5,646	5,665	19,730	34,613	6,407
Thorny Skate.	1,183	460	599	839	933	294	1,845	3,396	2,746
Little Skate.	97	250	424	802	29	1,135	2,012	1,775	21
Winter Skate.	565	285	1,288	245	17	283	1,088	2,832	74
Pollock.	346	624	93	35	93	73	379	1,152	997
White Hake.	73	935	3	50	20	0	798	778	334
Wolffish.	264	273	58	136	9	25	824	307	268
Halibut.	0	53	0	106	0	0	1,051	0	0
Ocean Pout.	189	104	145	64	7	222	388	316	29
Red Hake.	4	318	10	0	60	6	104	306	73
Offshore Hake.	4	0	10	0	60	6	104	290	62
Redfish.	16	94	3	4	7	4	46	98	58
Striped Bass.	0	0	0	0	0	0	19	108	104
Lobster.	1	7	0	7	7	0	97	1	7
Smooth Skate.	2	8	8	5	5	7	39	7	8
Barndoor Skate.	0	0	5	0	0	0	26	2	13
Butterfish.	0	0	0	0	0	0	0	17	0
Silver Hake.	0	318	0	0	0	0	0	15	9
Plaice.	0	5	0	2	0	0	5	3	0
Winter Flounder.	0	0	0	1	0	0	2	6	0
Yellowtail Flounder.	0	0	1	21	0	0	5	2	0
Monkfish.	58	0	18	9	18	7	0	0	0
Mackerel.	0	0	0	0	0	0	1	3	0
Clearnose Skate.	0	0	0	0	0	0	2	0	0
Herring.	0	0	0	0	0	0	2	0	0
Sea Scallop.	0	0	0	1	0	0	1	0	0
Loligo Squid	0	0	0	0	0	0	1	0	0
Witch Flounder.	0	0	0	0	0	0	0	0	0
Windowpane Flounder.	0	0	0	0	0	0	0	0	0
Illex Squid	0	0	0	0	0	0	0	0	0
Red Crab.	0	0	0	0	0	0	0	0	0
Fourspot Flounder.	0	0	0	0	0	0	0	0	0
Alewife.	0	0	0	0	0	0	0	0	0
Blueback Herring	0	0	0	0	0	0	0	0	0
Bluefish.	0	0	0	0	0	0	0	0	0
Black Sea Bass	0	0	0	0	0	0	0	0	0
Rosette Skate.	0	0	0	0	0	0	0	0	0
Scup.	0	0	0	0	0	0	0	0	0
Tilefish.	0	0	0	0	0	0	0	0	0
Tautog.	0	0	0	0	0	0	0	0	0
Gulf Stream Flounder	0	0	0	0	0	0	0	0	0
Southern Flounder.	0	0	0	0	0	0	0	0	0

The catch ratios for vessels using gillnets on Georges Bank and The Gulf of Maine are displayed in and Figure 132 and Figure 133, respectively. A ratio over 1.00 indicates a greater catch of the species in the numerator than in the denominator. For example, the skates / spiny dogfish ratio of 3.49 in Georges Bank indicates that there were 3.49 lbs. of skates caught for every 1 lb. of spiny dogfish. The observed catch of each species is represented as a percentage within the total observed catch of all species for each year in Figure 134 and Figure 135.

The catch ratios for vessels using gillnets on Georges Bank are displayed in Figure 132. Skates are the only listed species in that were caught more than cod, while haddock, redfish, monkfish and pollock all reported a lower catch than cod. The skates/species ratios are the highest ratios in the table aside from the

Total Catch/species ratios, indicating that skates made up a large amount of the total catch. The very low haddock/species ratios and redfish/species ratios indicate that haddock and redfish were caught much less often than cod and spiny dogfish. The species/cod ratios remain consistently over or under 1.00 for most species in the table except for pollock and monkfish. There was a higher observed catch of pollock than cod in 2011 and a relatively equal catch of the two in 2005, 2009 and 2010. There was a trend of higher monkfish catch than cod from 2004-2007 until the relative catch of monkfish dropped significantly in later years. Skates and spiny dogfish made up the majority of the observed total catch over the evaluated time period in Figure 134. This could indicate that vessels using gillnets on Georges Bank will continue to target skates and spiny dogfish in the future.

The catch ratios for vessels using gillnets in The Gulf of Maine are displayed in Figure 133. The pollock/cod ratio is the only ratio in the table, aside from the total catch/species ratios, that was over 1.00. This indicates that while pollock was caught more than cod, no other species in the table was caught more than cod or spiny dogfish. The species/cod ratios remain consistently under 1.00 for all species in the table over the evaluated time period, except for pollock. The pollock/cod ratios show numerous fluctuations, with the ratio being under 1.00 in 2004 and 2010. There was around four times as much pollock catch than cod catch in 2006 and 2007 before dropping down to around 1.5 times as much pollock catch than cod catch from 2008-2009 and 2011-2012. Cod, spiny dogfish and pollock made up the majority of the observed total catch over the evaluated time period in Figure 135. This could indicate that vessels using gillnets in The Gulf of Maine will continue to target spiny dogfish, pollock and cod.

Figure 132 - Catch ratios for vessels using gillnets on Georges Bank.

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	Overall Average
Gillnet										
Haddock/Cod.	0.11	0.04	0.03	0.02	0.02	0.06	0.14	0.03	0.08	0.07
Haddock/Spiny Dogfish.	0.04	0.02	0.01	0.01	0.01	0.03	0.05	0.01	0.01	0.02
Haddock / Total Catch.	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Redfish / Cod	0.01	0.09	0.00	0.36	0.16	0.03	0.02	0.08	0.03	0.07
Redfish/Spiny Dogfish	0.00	0.04	0.00	0.14	0.06	0.01	0.01	0.02	0.00	0.02
Redfish / Total Catch.	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Pollock / Cod	0.39	0.97	0.37	0.57	0.87	1.02	0.99	1.35	0.68	0.89
Pollock/Spiny Dogfish	0.16	0.43	0.10	0.22	0.32	0.44	0.32	0.26	0.07	0.24
Pollock / Total Catch.	0.03	0.07	0.02	0.02	0.05	0.12	0.05	0.05	0.02	0.04
Monkfish / Cod	1.96	1.99	1.09	1.52	0.34	0.21	0.64	0.66	0.52	0.96
Monkfish/Spiny Dogfish	0.82	0.88	0.30	0.60	0.12	0.09	0.21	0.13	0.06	0.26
Monkfish / Total Catch.	0.13	0.14	0.07	0.05	0.02	0.02	0.03	0.02	0.02	0.05
Skates / Cod	8.20	7.30	9.31	22.76	12.78	2.63	14.57	17.90	18.21	13.16
Skates/Spiny Dogfish	3.43	3.25	2.56	8.92	4.70	1.13	4.76	3.41	1.95	3.49
Skates / Total Catch.	0.55	0.51	0.58	0.76	0.70	0.32	0.69	0.66	0.59	0.63
Total Catch / Cod.	15.02	14.39	16.04	29.88	18.29	8.35	21.15	27.25	30.75	20.78
Total Catch/Spiny Dogfish	6.28	6.40	4.41	11.71	6.73	3.60	6.91	5.20	3.29	5.51

Figure 133 - Catch ratios for vessels using gillnets in The Gulf of Maine

	Fishing Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	Overall Average
Gillnet										
Haddock / Cod	0.03	0.03	0.05	0.03	0.07	0.01	0.03	0.03	0.03	0.03
Haddock/Spiny Dogfish	0.02	0.02	0.02	0.01	0.05	0.00	0.02	0.01	0.01	0.02
Haddock / Total Catch.	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01
Redfish / Cod	0.01	0.03	0.13	0.14	0.07	0.03	0.03	0.03	0.02	0.03
Redfish/Spiny Dogfish	0.01	0.02	0.04	0.06	0.05	0.02	0.03	0.01	0.00	0.02
Redfish / Total Catch.	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.00	0.01
Pollock / Cod	0.55	1.32	4.07	4.36	1.78	1.31	0.91	1.36	1.50	1.21
Pollock/Spiny Dogfish	0.39	0.86	1.34	1.92	1.36	0.72	0.79	0.61	0.30	0.65
Pollock / Total Catch.	0.13	0.24	0.42	0.48	0.35	0.28	0.22	0.23	0.16	0.23
Monkfish / Cod	0.44	0.75	0.35	0.54	0.15	0.13	0.15	0.22	0.28	0.28
Monkfish/Spiny Dogfish	0.32	0.49	0.12	0.24	0.11	0.07	0.13	0.10	0.06	0.15
Monkfish / Total Catch.	0.11	0.14	0.04	0.06	0.03	0.03	0.04	0.04	0.03	0.05
Skates / Cod	0.06	0.09	0.09	0.08	0.18	0.05	0.38	0.23	0.10	0.22
Skates/Spiny Dogfish	0.04	0.06	0.03	0.04	0.14	0.03	0.33	0.10	0.02	0.12
Skates / Total Catch.	0.02	0.02	0.01	0.01	0.04	0.01	0.09	0.04	0.01	0.04
Total Catch / Cod.	4.05	5.42	9.63	9.08	5.05	4.66	4.06	5.83	9.26	5.26
Total Catch/Spiny Dogfish	2.93	3.52	3.17	3.99	3.86	2.56	3.53	2.63	1.85	2.82

Figure 134 - Observed % of each species in total catch using gillnets on Georges Bank

	Fishing Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average %
Gillnet										
% of Cod in Total Catch.	6.7%	7.0%	6.2%	3.3%	5.5%	12.0%	4.7%	3.7%	3.3%	4.8%
% of Haddock in Total Catch.	0.7%	0.2%	0.2%	0.1%	0.1%	0.7%	0.7%	0.1%	0.3%	0.4%
% of Monkfish in Total Catch.	13.0%	13.8%	6.8%	5.1%	1.8%	2.5%	3.0%	2.4%	1.7%	4.6%
% of Pollock in Total Catch.	2.6%	6.7%	2.3%	1.9%	4.7%	12.2%	4.7%	4.9%	2.2%	4.3%
% of Redfish in Total Catch.	0.1%	0.6%	0.0%	1.2%	0.9%	0.4%	0.1%	0.3%	0.1%	0.3%
% of Skates in Total Catch.	54.6%	50.8%	58.0%	76.2%	69.9%	31.5%	68.9%	65.7%	59.2%	63.4%
% of Winter Flounder in Total Catch	0.6%	0.3%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%
% of Yellowtail Flounder in Total Catch	0.4%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%
% of Spiny Dogfish in Total Catch.	15.9%	15.6%	22.7%	8.5%	14.9%	27.8%	14.5%	19.2%	30.4%	18.1%

Figure 135 - Observed % of each species in total catch using gillnets in The Gulf of Maine

	Fishing Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average %
Gillnet										
% of Cod in Total Catch.	24.7%	18.5%	10.4%	11.0%	19.8%	21.5%	24.6%	17.1%	10.8%	19.0%
% of Haddock in Total Catch.	0.7%	0.5%	0.5%	0.4%	1.4%	0.2%	0.7%	0.5%	0.3%	0.5%
% of Monkfish in Total Catch.	11.0%	13.8%	3.6%	5.9%	2.9%	2.8%	3.6%	3.8%	3.0%	5.3%
% of Pollock in Total Catch.	13.5%	24.4%	42.3%	48.0%	35.2%	28.2%	22.4%	23.2%	16.2%	22.9%
% of Redfish in Total Catch.	0.4%	0.5%	1.4%	1.5%	1.3%	0.6%	0.7%	0.4%	0.2%	0.6%
% of Skates in Total Catch.	1.5%	1.6%	0.9%	0.9%	3.5%	1.1%	9.3%	4.0%	1.0%	4.2%
% of Winter Flounder in Total Catch	1.4%	0.8%	0.3%	0.7%	0.3%	0.3%	0.3%	0.6%	0.4%	0.6%
% of Yellowtail Flounder in Total Catch	2.0%	0.5%	0.6%	0.4%	1.3%	0.8%	1.9%	1.8%	1.3%	1.5%
% of Spiny Dogfish in Total Catch.	34.2%	28.4%	31.5%	25.1%	25.9%	39.1%	28.4%	38.1%	54.2%	35.5%

The catch ratios for vessels using hook gears on Georges Bank and The Gulf of Maine are displayed in and Figure 136 and Figure 137, respectively. A ratio over 1.00 indicates a greater catch of the species in the numerator than in the denominator. For example, the haddock / cod ratio of 7.28 in Georges Bank indicates that there were 7.28 lbs. of haddock caught for every 1 lb. of cod. The observed catch of each species is represented as a percentage within the total observed catch of all species for each year in Figure 138 and Figure 139.

The catch ratios for vessels using hook gears on Georges Bank are displayed in Figure 136. All of the species/cod and species/spiny dogfish ratios in Figure 136 are under 1.00 except for haddock. There was a consistently higher catch of haddock each year than cod or spiny dogfish, except for 2011-2012. Haddock made up the majority of the observed total catch over the evaluated time period in Figure 138. The very low percentages of every other species indicate that vessels using hook gears will likely primarily focus on haddock and spiny dogfish on Georges Bank in the future.

The catch ratios for vessels using hook gears in The Gulf of Maine are displayed in Figure 137. Every ratio in this table, aside from the total catch/species ratios, is under 1.00. The only year in the table that shows otherwise is 2004, showing a very large haddock/spiny dogfish ratio of 38.49, for example. There was also a higher observed catch of skates in 2004 than spiny dogfish. These ratios gradually decreased over the rest of the evaluated period. Haddock and spiny dogfish made up the majority of the total catch in Figure 139. This likely indicates that vessels using hook gears in The Gulf of Maine will focus primarily on cod, spiny dogfish and haddock in the future.

Figure 136 - Ratios of observed catch for vessels using hook gears on Georges Bank

	Fishing Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	Overall Average
Hook and Line										
Haddock/Cod.	18.72	9.91	7.35	13.96	7.52	3.67	3.90	0.82	0.23	7.28
Haddock/Spiny Dogfish	2.24	7.28	0.77	1.40	6.18	1.80	1.12	0.17	0.00	1.54
Haddock / Total Catch.	0.64	0.71	0.39	0.53	0.69	0.47	0.37	0.11	0.00	0.50
Redfish / Cod	0.09	0.09	0.01	0.08	0.05	0.01	0.03	0.00	0.00	0.04
Redfish/Spiny Dogfish	0.01	0.06	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.01
Redfish / Total Catch.	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollock / Cod	0.01	0.01	0.00	0.00	0.00	0.00	0.05	0.14	0.12	0.02
Pollock/Spiny Dogfish	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01
Pollock / Total Catch.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Monkfish / Cod	0.08	0.04	0.04	0.03	0.00	0.00	0.01	0.00	0.00	0.02
Monkfish/Spiny Dogfish	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monkfish / Total Catch.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skates / Cod	0.28	0.83	0.82	0.74	0.78	0.96	1.57	0.80	0.72	0.93
Skates/Spiny Dogfish	0.03	0.61	0.09	0.07	0.64	0.47	0.45	0.17	0.01	0.20
Skates / Total Catch.	0.01	0.06	0.04	0.03	0.07	0.12	0.15	0.10	0.01	0.06
Total Catch / Cod.	29.29	13.89	19.04	26.29	10.90	7.79	10.54	7.75	88.59	14.45
Total Catch/Spiny Dogfish	3.51	10.21	2.00	2.63	8.95	3.81	3.04	1.62	1.02	3.06

Figure 137 - Ratios of observed catch for vessels using hook gears in The Gulf of Maine

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	Overall Average
Hook and Line										
Haddock / Cod	0.62	0.89	0.61	0.32	0.40	0.23	0.24	0.38	0.66	0.41
Haddock/Spiny Dogfish	38.49	2.03	0.61	0.11	0.48	0.20	0.60	0.71	0.16	0.55
Haddock / Total Catch.	0.33	0.33	0.21	0.06	0.17	0.09	0.13	0.18	0.10	0.17
Redfish / Cod	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Redfish/Spiny Dogfish	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Redfish / Total Catch.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollock / Cod	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.10	0.01
Pollock/Spiny Dogfish	0.81	0.05	0.01	0.00	0.01	0.00	0.01	0.02	0.02	0.02
Pollock / Total Catch.	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01
Monkfish / Cod	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monkfish/Spiny Dogfish	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monkfish / Total Catch.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skates / Cod	0.10	0.06	0.21	0.14	0.07	0.07	0.12	0.10	0.29	0.11
Skates/Spiny Dogfish	6.08	0.14	0.21	0.05	0.08	0.06	0.30	0.19	0.07	0.15
Skates / Total Catch.	0.05	0.02	0.07	0.03	0.03	0.03	0.06	0.05	0.05	0.05
Total Catch / Cod.	1.87	2.67	2.91	5.35	2.36	2.47	1.82	2.09	6.49	2.41
Total Catch/Spiny Dogfish	115.90	6.07	2.90	1.78	2.83	2.16	4.63	3.88	1.55	3.20

Figure 138 - Observed % of each species in total catch using hook gears on Georges Bank

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average %
(blank)										
% of Cod in Total Catch.	3.4%	7.2%	5.3%	3.8%	9.2%	12.8%	9.5%	12.9%	1.1%	6.9%
% of Haddock in Total Catch.	63.9%	71.4%	38.6%	53.1%	69.1%	47.2%	37.0%	10.6%	0.3%	50.4%
% of Monkfish in Total Catch.	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%
% of Pollock in Total Catch.	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.5%	1.8%	0.1%	0.2%
% of Redfish in Total Catch.	0.3%	0.6%	0.1%	0.3%	0.5%	0.1%	0.3%	0.0%	0.0%	0.3%
% of Skates in Total Catch.	1.0%	6.0%	4.3%	2.8%	7.2%	12.4%	14.8%	10.3%	0.8%	6.4%
% of Winter Flounder in Total Catch	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
% of Yellowtail Flounder in Total Catch	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% of Spiny Dogfish in Total Catch.	28.5%	9.8%	49.9%	38.0%	11.2%	26.2%	32.9%	61.6%	97.6%	32.7%

Figure 139 - Observed % of each species in total catch using hook gears in The Gulf of Maine

Fishing Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average %
(blank)										
% of Cod in Total Catch.	53.4%	37.4%	34.4%	18.7%	42.3%	40.5%	55.1%	47.9%	15.4%	41.5%
% of Haddock in Total Catch.	33.2%	33.4%	21.0%	6.0%	17.0%	9.3%	13.0%	18.3%	10.2%	17.1%
% of Monkfish in Total Catch.	0.1%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
% of Pollock in Total Catch.	0.7%	0.9%	0.3%	0.0%	0.3%	0.1%	0.2%	0.6%	1.6%	0.5%
% of Redfish in Total Catch.	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
% of Skates in Total Catch.	5.2%	2.2%	7.2%	2.6%	3.0%	2.8%	6.5%	4.8%	4.5%	4.6%
% of Winter Flounder in Total Catch	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% of Yellowtail Flounder in Total Catch	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% of Spiny Dogfish in Total Catch.	0.9%	16.5%	34.5%	56.2%	35.3%	46.3%	21.6%	25.8%	64.3%	31.2%

6.6.5 Literature Review of Closed Area Effectiveness in New England

The Closed Area Technical Team (CATT) identified the following potential goals and objectives for closed area management in the current groundfish regulatory environment.
The primary goals of groundfish closed area management are to:

1. enhance critical groundfish fishery productivity
2. maximize societal net benefits from the groundfish stocks by addressing current management needs

Objectives for the design of groundfish closed area management options:

1. Improved spawning protection
2. Improved protection of critical groundfish habitats
3. Improved refuge for critical life history stages
4. Improved access to both the use and non-use benefits arising from closed area management across gear types, fisheries and groups.

These goals and objectives guide the CATT's analysis of both Framework 48 (in the near term) and the Omnibus Habitat Amendment (in the longer term). In addition, the CATT has emphasized that much of the current debate over allowing access to the closed areas (Framework 48) requires weighing short-term gains against long-term losses in productivity. Many ecosystem and stock characteristics affect groundfish productivity, including: demographic attributes of a stock, especially size and age structure; behavioral characteristics, e.g. spawning behavior; habitat availability and suitability for shelter, foraging, etc.; and food web structure and diversity. Closed areas can specifically enhance these characteristics, thereby enhancing stock productivity, in addition to their role in protecting a segment of the stock from exploitation.

In light of the above goals for both Framework 48 and the Omnibus Habitat Amendment, this review provides a detailed summary of all relevant literature concerning the performance of Closed Areas 1 and 2, the Western Gulf of Maine Closed Area, the Nantucket Lightship Closed Area and Cashes Ledge Closed Area relative to their effects on groundfish fishery productivity. The compilation of literature allows for more informed analysis of the effectiveness of these closed areas and identifies areas of consensus and disagreement. This assessment covers each closed area individually and for each provides a list of findings related to the success of each area relative to its original stated objective, including positive, negative, and neutral effects. In addition, it identifies any ancillary effects that have occurred either inside or outside the closures. Following each list is a brief discussion comparing the varying conclusions of the research related specifically to managed fish species. Then, the effects of the closed areas on other aspects of productivity are described collectively. The assessment concludes with a synthesis of results and their implications for the goals outlined above.

Table 66 - Summary of consensus effects of closed areas on groundfish FMP and related species (see Key for designations and descriptions)

	WGOM	CA1	CA2	CL	NLS
Haddock	+	+	+/-	+/-	+
Cod	+	na	+	+	na
Yellowtail	--	+	+	na	-
Pollock	+	na	na	na	na
Monkfish	+/-	na	na	na	na
Dogfish	+	na	na	na	+
Skates	+	na	na	na	+
Winter Fl.	na	+	na	na	na

Key

Designation	Description
+	multiple positive effects found (and no negative or neutral effects)
+	mixture of positive and neutral effects, with no negative effects (i.e. "leaning positive"), **or** only a positive effect, but only in a single study
+/-	only neutral or insignificant effects were found
-	leaning negative, **or** only negative effect, but only in a single study
--	multiple negative effects found (and no positive or neutral effects)
na	no data found in the review for the given species/area combination

Western Gulf of Maine Closed Area	Effect (+ or -)	Source(s)
Effects on Managed Species		
Haddock move in and out of closed areas; preliminary data suggest that more haddock are moving out of closed areas (spillover) than are moving in	+/-	Rudolph, 2009
Haddock higher in abundance and biomass inside vs. outside the closure	+	Brown et al. 2010
Monkfish abundance closely related to specific habitats, with no significant effect of the closure	+/-	Grabowski 2007, Smith et al. 2008
Greater abundance (2x) and biomass (3x) of groundfish within closure	+	Grizzle 2009
Almost all of the larger cod and pollock were caught inside the closure	+	Grizzle 2009
Pollock biomass 6x greater inside vs. outside closure	+	Grizzle 2009
Cod biomass 3x greater inside vs. outside closure	+	Grizzle 2009
Haddock biomass ~1.5x greater inside vs. outside closure in gillnet survey	+	Grizzle 2009
Cod within closure prefer “edge”-type habitat	+/-	Grabowski 2007
No effect found for haddock abundance in trawl survey; haddock larger outside closure in spring, smaller outside the closure in fall	+/-	Grabowski 2007
Haddock, witch flounder and dogfish had higher biomass within closure	+	Kaufman 2007
Yellowtail flounder and winter flounder had higher biomass outside, possibly because of altered competition relationships	-	Kaufman 2007
No positive effect of closure on cod observed in trawl survey data	+/-	Kerr et al. 2012
Positive effect of closure on catch(weight)-per-tow for haddock	+	Kerr et al. 2012
Density gradient of effort suggests spillover effect	+	Murawski et al. 2005
Revenues greater near closed area boundaries, but also more variable; can be more profitable, but also more uncertain to “fish the edge”	+/-	Murawski et al. 2005
Habitat Effects		
Increase in density, biomass, and taxonomic richness of epifaunal and infaunal communities	+	Grizzle 2009
Open area dominated by opportunistic, disturbance tolerant species; closed area dominated by disturbance intolerant, sessile species	+	Knight et al. 2005
Other Ecosystem Effects		
Species richness and abundance increased, but mean diversity decreased within closure	+/-	Cournane 2010
Ocean pout, skates, dogfish, and wolffish species higher in abundance inside vs. outside the closure; skates and dogfish had higher biomass inside vs. outside the closure	+	Brown et al. 2010
Recovery of benthic invertebrate community in many areas in the closure	+	Grizzle et al. 2009
Red hake had higher biomass within the closure; sculpin and sea raven higher biomass outside, possibly because of altered competition relationships	+/-	Kaufman 2007
Stable isotope analysis revealed different food web preferences for species inside vs. outside the closure, possibly a result of higher diversity of prey species within closure	+/-	Kaufman 2007

The original purpose of the WGOMCA was to reduce the mortality of Atlantic cod and it became a general mortality closure for other stocks over time. During this time however, recreational fishing has been allowed. Grizzle (2009) found that the WGOMCA contains larger cod than outside the closed area. The study also observed, using a gillnet survey, that cod biomass was 3 times greater inside the WGOMCA than outside. Kerr et al. (2012) similarly found a significantly larger probability of occurrence of cod inside the closure versus outside, but no significant interaction of this effect and a time effect. In other words, there was a higher probability of occurrence of cod inside vs. outside both before and after the area was closed, leading the authors to conclude that there were no positive effects of the closure on cod.. It should be noted that the Kerr et. al study deserves extra consideration due to the more expansive study method they undertook (summarized in this paper) as well as their use of trawl survey data. While the two studies do not technically disagree, the additional components within the Kerr et. al paper such as the inclusion of both location and time effects suggests that their conclusion is more robust. Due to the differing results of all the considered studies, there does not appear to be a clear consensus on the effectiveness of the WGOMCA for cod.

However, research suggests that the WGOMCA has had a positive effect on other groundfish species, especially haddock. Multiple studies observed larger and more abundant haddock inside the closed area, and found evidence of spillover. Grabowski (2007) was the only referenced study that specifically noted no positive effect for haddock abundance, though it should be noted that the study used a trawl survey rather than a gillnet survey (such as in the 2009 Grizzle study that found an effect), and over a shorter time period than the trawl data series in Kerr et al. (2012). This suggests a need to consider the 2009 Grizzle study and the Kerr et. al paper more deeply in the discussion of these results. In addition to haddock, the research suggests that other species such as witch flounder, dogfish, skates, ocean pout, red hake, and pollock have benefited from the closure, while monkfish did not experience any significant effects.

Cashes Ledge Closed Area	Effect (+ or -)	Source(s)
Effects on Managed Species		
No significant closure effects for groundfish species investigated	+/-	Kerr et al. 2012
No evidence from fishing effort data of a spillover effect	+/-	Murawski et al. 2005
Haddock move in and out of closed areas; preliminary data suggest that more haddock are moving out of closed areas (spillover) than are moving in	+/-	Rudolph 2009
Cod are abundant in the area and closure protects habitat important for cod	+	Grabowski 2010
Two distinct color variations found for cod (red and olive); red cod are probably protected by closure but the larger, deeper olive cod may not be	+/-	Sherwood and Grabowski 2010
Habitat Effects		
EFH for juvenile cod in kelp habitat, and adult cod utilize all habitat types	+	Grabowski 2010
Other Ecosystem Effects		
Species richness and abundance increased, but mean diversity decreased within closure	+/-	Cournane 2010

Cashes Ledge was established as a general groundfish rebuilding closure. It was first protected seasonally in 1997 but was not closed year-round until 2002. There does not appear to be a clear consensus in the relative paucity of research regarding the effectiveness of Cashes Ledge as it specifically relates to that goal. While Grabowski (2010) and Sherwood and Grabowski (2010) confirmed that Cashes Ledge is prime cod habitat and supports an abundance of cod in all life stages, Kerr et al. (2012) found no significant effects of the closure on any of the groundfish species they investigated, although it was noted in that study that there was a particularly small sample size for the Cashes Ledge region for many groundfish species. Murawski et al. (2005) observed no spillover effect in their fishing effort data, although those data were mostly from 2003, which was only one year since the year-round closure of Cashes.

The Nantucket Lightship Closed Area was established to protect juvenile yellowtail flounder. The examined research suggests a consensus that the closed area has not been effective with regard to this goal. Valliere and Pierce (2007) observed that in their industry-based survey cruises, less than 3% of the yellowtail flounder stock by weight was contained within the closed area. Barkley et al. (2011) found that biomass of yellowtail flounder inside the closure was lower than outside. Both of these studies attained their results by using trawl surveys, yet the Valliere and Pierce study took their results from 2003-2005 as opposed to Barkley's shorter time frame of September-November 2011.

Nantucket Lightship Closed Area	Effect (+ or -)	Source(s)
Effects on Managed Species		
Increases in scallops and sedentary finfish; 14-fold increase in scallop biomass	+	Murawski et al. 2000
Yellowtail flounder catch-per-tow decreased both outside and inside closure, and decreased more steeply inside	-	Kerr et al. 2012
Significant positive effect of closure on catch(number)-per-tow of haddock	+	Kerr et al. 2012
Biomass estimates of YF in the closure were lower than in the surrounding area	-	Barkley et al. 2011
After the closure, spawning-stock biomass increased and exploitation rates decreased for GB cod, haddock, and GB and SNE yellowtail flounder (only slightly for cod and SNE YF, but significantly for haddock and GB YF)	+	Murawski et al. 2000
Fishermen claimed that closure has not provided any apparent benefit for SNE YF recovery	+/-	Valliere and Pierce 2007
No more than 3% of yellowtail stock by weight was present by weight during Industry-Based Survey cruises, and in most cases less than 1%	-	Valliere and Pierce 2007
Other Ecosystem Effects		
Overall species abundance increased, while species richness and diversity decreased within closure	+/-	Cournane 2010
Fishermen claimed that in their experience, dogfish, skate, fourspot flounder, sculpin, and sponges had all increased in abundance in the area	+/-	Valliere and Pierce 2007

Kerr et al. (2012) found a positive effect of the closure on catch-per-tow of haddock.

Closed Area 1	Effect (+ or -)	Source(s)
Effects on Managed Species		
Acoustic tagging revealed that at least a portion of haddock stock is resident in this closed area; identified a north-south "haddock highway" in the center of the closed area	+	Sherwood 2009
Haddock move in and out of closed areas; preliminary data suggest that more haddock are moving out of closed areas (spillover) than are moving in	+/-	Rudolph 2009
Modelling study suggesting that larval release from this closed area is seeding outside areas	+	Fogarty 2007
Positive effects of closure on haddock (weight-per-tow) and winter flounder (weight-per-tow)	+	Kerr et al. 2012
Improved recruitment survival for some groundfish stocks may be due to the protection of critical nursery habitats	+	Murawski et al. 2000
After the closure, spawning-stock biomass increased and exploitation rates decreased for GB cod, haddock, and GB and SNE yellowtail flounder (only slightly for cod and SNE YF, but significantly for haddock and GB YF)	+	Murawski et al. 2000
Revenues greater near closed area boundaries, but also more variable; i.e, it can be more profitable, but also more uncertain, to "fish the edge"	+/-	Murawski et al. 2005
Evidence of spillover effect from the fact that catches are higher at borders	+	Fogarty 2007, Murawski et al. 2005
Increases in scallops and sedentary finfish; 14-fold increase in scallop biomass	+	Fogarty 2007, Murawski et al. 2000
Little difference found for fish biomass and abundance inside vs. outside, however individuals of species incl. flounder and haddock were generally larger inside the closed area	+/-	Link et al. 2005
Fishermen claimed to have seen YF biomass growth within closed area	+	Valliere and Pierce 2007
Habitat Effects		
Improved recruitment survival for some groundfish stocks may be due to the protection of critical nursery habitats	+	Murawski et al. 2000
Other Ecosystem Effects		
Species richness and abundance increased, but mean diversity decreased within closure	+/-	Cournane 2010

The stated purpose of Closed Area 1 pre-1994 was to protect haddock spawning, but after 1994 the purpose of Closed Area 1 was modified to reduce general groundfish mortality. The research suggests a consensus that the closed area is accomplishing this goal, as evidenced by increased productivity of numerous stocks. Sherwood (2009) found that a sizeable portion of the haddock stock is resident within the closed area, and Link et al. (2005) observed that individuals within the closed area were larger than outside. At the same time, there is evidence of spillover of adults and a modeling study suggested larval seeding of outside areas (Fogarty 2007, Murawski et al. 2005). In addition to haddock, positive effects of the closure were noted for winter flounder and yellowtail flounder.

Closed Area 2	Effect (+ or -)	Source(s)
Effects on Managed Species		
Haddock move in and out of closed areas; preliminary data suggest that more haddock are moving out of closed areas (spillover) than are moving in	+/-	Rudolph 2009
No significant positive impacts of the closure were detected for haddock	+/-	Kerr et al. 2012
After closure was implemented, increase in catch-per-tow of haddock was greater outside closure boundaries than inside	-	Kerr et al. 2012
Overall area occupied by yellowtail flounder increased by a factor of 2 when abundance was high	+	Pereira et al. in press
Local density of yellowtail flounder increased in high-quality habitat closed to commercial fishing	+	Pereira et al. in press
Condition of YF females decline slightly at high abundance	-	Pereira et al. in press
Condition of YF males did not change with abundance	+/-	Pereira et al. in press
Improved recruitment survival for some groundfish stocks may be due to the protection of critical nursery habitats	+	Murawski et al. 2000
After the closure, spawning-stock biomass increased and exploitation rates decreased for GB cod, haddock, and GB and SNE yellowtail flounder (only slightly for cod and SNE YF, but significantly for haddock and GB YF)	+	Murawski et al. 2000
Revenues greater near closed area boundaries, but also more variable; can be more profitable, but also more risky to “fish the edge”	+/-	Murawski et al. 2005
Evidence of spillover effect from the fact that catches are higher at borders	+	Fogarty 2007, Murawski et al. 2005
Increases in scallops and sedentary finfish; 14-fold increase in scallop biomass	+	Fogarty 2007, Murawski et al. 2000
Little difference found for fish biomass and abundance inside vs. outside	+/-	Link et al. 2005
Fishermen claimed to have seen growth of YF biomass within closed area	+	Valliere and Pierce 2007
Habitat Effects		
Video and photographic evidence that colonial epifaunal species are much more abundant at undisturbed sites	+	Collie et al. 2000, Fogarty 2007
Percent seabed cover increased for sponges	+	Collie et al. 2005
Increase in colonial epifauna used for juvenile cod refuge	+	Collie et al. 2005
Local density of yellowtail flounder increased disproportionately in high-quality habitat closed to commercial fishing (specifically stratum 1160 in southern portion of the closure)	+	Pereira et al. in press
Closure area confirmed as encompassing a large area of preferred habitat for yellowtail flounder	+	Pereira et al. in press
Improved recruitment survival for some groundfish stocks may be due to the protection of critical nursery habitats	+	Murawski et al. 2000
Other Ecosystem Effects		
Biomass, abundance, and number of species increased	+	Collie et al. 2005
Species richness and abundance increased, but mean diversity decreased within closure	+/-	Cournane 2010
Increases in crabs, seastars, and mollusks	+	Collie et al. 2005
Greater than 10-fold increase in benthic megafaunal production, mainly from sea scallops and sea urchins	+	Hermsen et al. 2003

Increase in abundance of many prey species for juvenile cod	+	Collie et al. 2005

Closed Area 2's stated purpose before 1994 was also to protect haddock spawning, but after 1994 the purpose was adjusted to reduce general groundfish mortality. Our literature search did not reveal a large amount of research related specifically to haddock in Closed Area 2. The related research does not suggest a consensus on the effectiveness of the closed area in achieving the original goal or the modified goal established in 1994. Kerr et al. (2012) states that there was an increase over the study period in catch-per-tow of haddock both inside and outside there closure, however this increase was greater outside the reserve than inside. Overall spawning-stock biomass has increased since the closure, and there is evidence of spillover (Murawski et al. 2000, Rudolph 2009). With reference to stocks other than haddock, there was a positive effect of the closure on yellowtail flounder biomass noted by fishermen, and evidence of spillover of groundfish species out of the closed area. In addition, Pereira et al. (in press) confirmed a disproportionate increase in local density of yellowtail flounder in preferred habitats (stratum 1160) which are encompassed by a substantial portion of Closed Area 2. Over time, an increasing percentage of total survey catch for yellowtail was from that habitat.

Other Aspects of Productivity:

The New England closed areas have had productivity effects beyond their direct impacts on biomass and abundance of managed groundfish species. A multitude of research on the effects of the closed areas has focused on other ecosystem effects and characteristics, such as habitat, other species, and diversity metrics. For example, research in the WGOMCA, Cashes Ledge, and Closed Area 2 has identified strong effects of the closed areas on the recovery of infaunal and epifaunal benthic species and habitat diversity. Collie et al. (2005) and Grabowski (2010) confirmed the association of some of those habitat characteristics with juvenile groundfish, especially cod. Cournane (2010) measured fish community abundance, species richness, and diversity across the closed areas and found positive effects of the closures on abundance and species richness for the WGOMCA, Cashes Ledge, Closed Area 1 and Closed Area 2. Multiple studies also observed an increase in benthic invertebrates and groundfish prey species associated with the closed areas (e.g. Kaufman 2007, Collie et al. 2005). Finally, the closed areas have had a large effect on scallop biomass. Murawski et al. (2000) observed a 14-fold increase in scallop biomass associated with the Georges Bank closures. The closed areas are the basis for a productive rotational scallop fishery.

Kerr et. al. 2012, "Evaluating the impact of closed areas in the Gulf of Maine and Georges Bank on groundfish productivity."

The Kerr et. al. (2012) study is one of the most relevant and comprehensive studies that was investigated in this review. The study (data collection and analysis currently completed but in "working paper" form) analyzed NEFSC bottom trawl survey data from 1979-2010 in an attempt to, "evaluate the impact of groundfish closed areas in the northwest Atlantic Ocean on the productivity of the specific groundfish stocks they were designed to help rebuild." The study was designed as a before-after control-impact (BACI) study. Data for twelve groundfish species were collected from the trawl database for catch(number)-per-tow, catch(weight)-per-tow, and simple probability of occurrence in a tow. In the BACI design, a significant effect of the closed area for a given species was defined as a significant interaction between the two main effects of time (before vs. after the closure) and location (inside vs. outside the closure) on the value of one of the three metrics above. The study also noted any significant responses to the two main effects, i.e. location only or time only.

A final important aspect of study design was Kerr et al.'s definition of inside versus outside a closed area. In order to control as much as possible for factors such as habitat similarity, the study 1) only used trawl data from survey strata represented within the closed areas, and 2) only used data within a 0.12 decimal degree buffer outside the area. This is important to consider because of the potentially unique aspects of the edges of the closed areas, such as increased fishing effort in those areas and/or localized spillover of fish over the closed area boundaries.

Any significant effects for primary species found in Kerr et. al. (2012) are noted in the tables for each closed area in this review. It is important in the interpretation of significant results to remember the definition of a closed area effect as defined in the study. For example, a species could be higher in abundance inside a closed area, but this study would not report that as a significant effect unless there was a positive interaction between that effect (location) and the time effect, i.e. an *increase* in abundance over time for the species was significantly larger inside versus outside the area.

Graham Sherwood- "Impact of Gulf of Maine and Georges Bank closed areas on cod life-history variation"

On October 29, Dr. Graham Sherwood presented the results of his study to the Closed Area Technical Team. The objective of his study was to determine whether cod exist as distinct ecotypes in the Gulf of Maine and Georges Bank and, if so, if closed areas alter the relative proportion of these. In other words, do cod exhibit resident versus migratory behavior and do closed areas favor resident types?

The study used hook-and-line or long line captures inside and outside of the Western Gulf of Maine closure, Cashes Ledge closure, Closed Area 1, and Closed Area 2 and utilized a morphometrics approach. Morphometrics is the analysis of body shape. Different ecotypes of cod can be distinguished using morphometrics, for example resident cod have more robust bodies while migrats have more streamlined bodies. Besides measuring the cod for analysis of ecotype, the study collected data to analyze age, size, growth, stomach fullness, prey, trophic level, and condition factor of cod for comparison of inside versus outside the closed areas

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Dr. Sherwood reported a number of finding relevant to the CATT. The morphometric results showed that, in general, cod inside closed areas exhibit sedentary body types, while cod caught outside closed areas exhibit migratory body types. One implication of this is that there is some evidence from other species that resident types are less productive than migrants, and if the closed areas are protecting residents and not migrants, it may have an effect on cod stock dynamics.

With regard to age structure, Dr. Sherwood reported that for all closed areas, median age was consistently 1 year older inside versus outside the closed areas, and there were significantly more older cod (>5 years old) inside than outside. Hence, the closed areas are exhibiting a more complete age structure of cod inside their boundaries than outside. In addition, stomach fullness was significantly higher inside than outside and cod inside closed areas achieved a higher trophic position. However, the Western Gulf of Maine/Jeffrey's Ledge seemed somewhat of an outlier, as cod there exhibited a significantly *lower* mean length inside versus outside the closure. One hypothesis for this was the large recreational effort in the Western Gulf of Maine compared to the other closed areas. Dr. Sherwood concluded that based on analysis of 10 life-history variables, cod are generally in better health inside versus outside of closed areas for Closed Area 1, Closed Area 2, and Cashes Ledge, while the reverse was true for Jeffrey's Ledge.

6.6.5.1 Conclusions

Analysis of short-term economic gain versus long-term productivity losses associated with the potential opening of closed areas is a main short-term goal of the CATT related to disaster mitigation efforts and Framework 48. Productivity of groundfish species is affected by many ecosystem characteristics, and many of those have been studied in relation to the effect of New England's groundfish closed areas.

Aggregating all the data presented in this review to make definitive statements about short versus long-term effects is difficult. However, one way to conceptualize these results is through their effect on the uncertainty inherent in other control measures. Stefansson and Rosenberg (2005) modeled the effect of using multiple control measures in fishery management on short-term and long-term yield and the probability of stock collapse. They found that, for increasing rates of fishing mortality or uncertainty, combining quota control with an expansive and well-designed closed area network can substantially reduce the probability of stock collapse and increase long-term economic yield. In other words, risk associated with uncertainty in quota control can be buffered by closed areas because of their effects on enhancing productivity and protecting a portion of the stock from overexploitation.

The reviewed research highlights a number of different study methods that have yielded different results. For example, different effects on haddock in the WGOMCA were suggested by Grizzle (2009, gillnet survey), Kerr et al. (2012, BACI analysis of long-term trawl survey data), and Grabowski (2007, short-term trawl survey data). Considering the difference in study methods, it would appear there are studies used for this assessment that should carry more weight in the discussion of these results. While most of the groundfish studies did use trawl surveys for their results there are differences in their methods that should be noted. The 2012 Kerr et. al paper considered additional components in their results, such as a comparison of biomass inside and outside the closures over time. The 2007 Valliere and Pierce study also considered a more expansive range of trawl survey data from 2003 to 2005 . In considering the amount of detail used in each of these studies, the results of the 2012 Kerr et. al paper and the 2007 Valliere and Pierce paper should carry extra weight in the discussion of the closed areas' effectiveness. The variability in the results of these studies also suggests that perhaps a more organized structure to the research of these closed areas is needed. While occasionally differing in its conclusions, this body of research also presents the opportunity to investigate methods and study design, in order to determine appropriate design for future research on closed areas.

This literature review has provided a comprehensive synthesis of research relating to New England's closed areas and their effects on the productivity of groundfish and other related species. All of the closed areas have had effects, but not always direct positive effects on the species for which they were originally intended. However, it should be noted that in the period since the implementation of the closed areas there have been overall increases in spawning-stock biomass and decreases in the exploitation rates of many managed groundfish species, including haddock, Georges Bank cod, and Georges Bank yellowtail flounder (Murawski et al. 2000). This review can and should be used to inform future research and decision-making about closed area design.

7.0 Environmental Consequences – Analysis of Impacts

7.1 Biological Impacts

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

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 the projections tend to be optimistic when they extend beyond a short-term period (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 proven unsuccessful. These factors should be considered when reviewing impacts that use this tool.

7.1.1 Updates to Status Determination Critieria, Formal Rebuilding Programs, and Annual Catch Limits

7.1.1.1 Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake

7.1.1.1.1.1 Option 1: No Action

Impacts on regulated groundfish

Adoption of the No Action alternative would mean the status determination criteria (SDC) for the two cod stocks, SNE/MA yellowtail flounder, and white hake would be the criteria adopted in Amendment 16. These values were based on the GARM III assessments completed in 2008. Since new benchmark assessments will have been completed for these stocks before this action is implemented, and as part of those assessments new SDCs were determined, the use of GARM III values would conflict with M-S Act requirements to use the best available science.

It is difficult to directly compare the Amendment 16 SDCs with updated biomass target values to determine the impacts if the older values are retained because of differences between assessments. For SNE/MA yellowtail flounder, the No Action biomass target of SSB_{MSY} is larger than the Option 2 biomass target of B_{MSY}. Using this value as the rebuilding target might lead to larger stocks sizes because management measures would be designed to attempt to reach this value. It is not clear, however, that this would actually be possible. The larger biomass target is based in part on assuming that recruitment will return to levelss that have not been seen in decades.

The changes in the biomass targets for the two cod stocks and white hake will not be known until the relevant assessments are completed. As noted before, the Option 1 No Action values would not use the best available science, unlike the Option 2 values.

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

Impacts on other species

Adopting this option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. It does, however, also determine the maximum fishing mortality rates that are permissible and as a result puts a cap on catches of these species. Since the allowed catches could influence the level of fishing effort it may indirectly affect catches of monkfish, skates, and dogfish that are made while targeting these stocks.

SNE/MA yellowtail flounder is allocated to the scallop fishery. The Option 1/No Action maximum fishing mortality threshold is lower than that in Option 2, and generally would be expected to result in lower catches. How this might impact scallops is unclear and would depend on whether this decision influences the allocation of this stock to the scallop fishery. Assuming that the proportion allocated to the scallop fishery is independent of this decision, a lower catch of yellowtail flounder could constrain scallop fishing activity and result in a reduced mortality rate (when compared to Option 2) for the portions of that stock that overlap the SNE/MA yellowtail flounder stock area.There are a number of factors that influence scallop fishing activity (such as access area openings, trip limits, DAS allocations, etc.) and this conclusion is, as a result, highly speculative.

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

Impacts on regulated groundfish

Adoption of Option 2 would mean the status determination criteria (SDC) for the two cod stocks, SNE/MA yellowtail flounder, and white hake would be the criteria developed at the most recent benchmark assessments and would be basedo n the best available science, consistent wit hteh M-S Act.

It is difficult to directly compare the Amendment 16 SDCs with updated biomass target values to determine the impacts if the older values are retained because of differences between assessments. For SNE/MA yellowtail flounder, the Option 2 B_{MSY} target is lower than the Option 1/No Action SSB_{MSY} alternative. Using this as a biomass target would, over the long-term, lead to lower stock sizes and reduced SSB. This conclusion, however, nees to be interpreted in light of the different recruitment assumption used to develop the two alternatives. Option 2 is based on recruitment that has been observed in a recent time period. Recruitment has been lower than that used to develop the Option 1/No Action target. Should this lower recruitment accurately represent future recruitment, the Option 2 target will lead to lower stock sizes, but the Option 1 target would be unattainable and so any comparison is meaningless. If larger recruitments are observed, then biomass should still increase and the target can be revised again in the future.

For GOM cod, GB cod, and white hake, this option would adopt fishing mortality and biomass targets based on results of the benchmark assessments planned for December 2012 – February 2013. These could be higher or lower than the Option 1/No Action values.

Impacts on other species

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

7.1.1.2 SNE/MA Windowpane Flounder Sub-ACLs

7.1.1.2.1.1 Option 1: No Action

Impacts on regulated groundfish

This option would not adopt any additional sub-ACLs for SNE/MA windowpane flounder. As a result, the only sub-ACL for this stock would be for the groundfish fishery, and only the groundfish fishery would have an AM. Because the groundfish fishery only catches a small part of this stock (about 20 percent, see Table 36), when compared to adopting any or all of the other options this measure is more likely to result in overfishing. The ACL for this stock was exceeded in FY 2011, suggesting that controls on other fisheries are needed to effectively constrain catches to the ACL. If this option is adopted, it increases the risk that overfishing will occur for a longer period since the AM is unlikely to modify catches enough to end overfishing. This is because measures taken to control catches by the groundfish fishery can only affect part of the catch. This is true when comparing this option to either Option 2 or Option 3, or Option 2 and Option 3.

Impacts on other species

This option is unlikely to have direct impacts on any other species. When compared to the adoption of Options 2 and 3, it could result in higher mortality on other stocks because other fisheries would not be subject to AMs if the ACL is exceeded. But all of those fisheries have their own measures in place that are designed to prevent overfishing, so this is unlikely and any differences are not likely to be measureable.

7.1.1.2.1.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL *(Preferred Alternative)*

Impacts on regulated groundfish

If this option is adopted, a sub-ACL of SNE/MA windowpane flounder would be allocated to the scallop fishery. As a result, the scallop FMP would be modified in a future action to adopt AMs for this stock. The biological effects of this measures are actually due to the adoption of an AM, and not the administrative allocation of a portion of the ACL to the scallop fishery. Once the scallop fishery AM would be adopted, this measure would increase the amount of catch of this stock that is directly subject to an AM. In FY 2011 and FY 2010, the catches by the scallop fishery and the groundfish fishery totaled 47 percent of the catch. By adopting an ACL for the scallop fishery, nearly half the catches of this stock will be subject to AMs; when compared to Option 1 No Action, it is less likely that overfishing will occur. When compared to Option 3, slightly less of the catch will be subject to AMs and the risk of overfishing may be greater.

Impacts on other species

Option 2, if adopted, and if the AMs are triggered, may result in reduced fishing mortality for non-groundfish species that are caught on groundfish and scallop fishing trips. This is because the AMs may reduce fishing activity in areas where this stock is caught. Mortality of these stocks under this measure would be expected to be lower than Option 1 No Action. Mortality might be higher than under Option 3 for some species, since that option would constrain activity in other fisheries.These differences would only occur if the AMs are triggered because an ACL is exceeded. It should be noted that the effects on the scallop and other resource are difficult to predict because they would be influenced by management measures for those fisheries.

7.1.1.2.1.3 Option 3: Other Sub-Components Sub-ACL *(Preferred Alternative)*

Impacts on regulated groundfish

This option would modify the identification of the amount allowed for other sub-components in federal waters, and would call this amount a sub-ACL. As a result, these catches would be subject to an AM. While changing the designation is an administrative measure that would not have direct biological impacts on any groundfish species, the change would lead to the adoption of an AM. If this option is adopted and Option 2 is not adopted, about 74 percent of the catches would be subject to AMs; if adopted in concert with Option 2, about 97 percent of the catch would be subject to AMs. So indirectly, once this option and the appropriate AMs would be adopted, the risk of continued overfishing of SNE/MA windowpane flounder would be reduced.

Impacts on other species

Option 3, if adopted, and if the AMs are triggered, may result in reduced fishing mortality for non-groundfish species that are caught on non-groundfish fishing trips. This is because the AMs may reduce fishing activity in areas where this stock is caught. The species most likely to be affected can be inferred from the fisheries that catch SNE/MAB windowpane flounder as shown in Table 38: sea scallops ,fluke, scup, and squid. Mortality of these stocks under this measure would be expected to be lower than Option / No Action. Mortality might be higher than under Option 3 for some species, since that option would constrain activity in other fisheries. These differences would only occur if the AMs are triggered because an ACL is exceeded. It should be noted that the effects on the scallop and other resources are difficult to predict because they would be influenced by management measures for other fisheries.

7.1.1.3 Scallop Fishery Sub-ACL for GB Yellowtail Flounder

7.1.1.3.1 Option 1: No Action

Impacts on regulated groundfish

Under this option, the amount of GB yellowtail flounder allocated to the scallop fishery is determined when groundfish and scallop fishery specifications are set. There is no fixed amount defined for the allocation. This allows for consideration of groundfish stock conditions and scallop fishery conditions when setting the sub-ACL. From the standpoint of GB yellowtail flounder fishing mortality, this is primarily an allocation decision and as long as the catch of each fishery is limited to its allocation it should have minimal biological effects. The structure of the management measures for the scallop and groundfish fisheries differ. While there are measures in place that control groundfish fishery in-season catches, the scallop fishery catches are not similarly limited. If there is an overage of a sub-ACL, the scallop AMs attempt to control catches in future years. For this reason, if the allocation to the scallop fishery is much less than the expected catch, the risk of overfishing increases.

When compared to the other options, however, the effects on fishing mortality may be different. Options 2 and 3 define specific approaches to setting the sub-ACL. As such, there is less flexibility to account for vagaries in stock conditions or the fishery. It is possible that under the other two options, the sub-ACL may be set at a level that is not consistent with catches in the scallop fishery. If that is the case, the risk of overfishing may increase if the sub-ACL is lower than needed. This is also a risk under the Option 1 No Action alternative, however, since the sub-ACL is typically set for a two or three year period and is not changed during that period. It is also possible under this option that the amount allocated to the scallop fishery will be too large. If this occurs, then fishing mortality may be lower than expected as long as catches are kept below the sub-ACLs.

This measure is not likely to have direct impacts on other groundfish stocks, and does not differ from either Option 2 or Option 3 in that regard.

Impacts on other species

The primary impact of this measure is on the scallop resource in the GB and SNE areas. Scallop fishing activity can be limited if the sub-ACL is exceeded. The AM can limit scallop fishing activity in certain areas, and as a result effort can shift to other areas. If this is not planned for by the scallop FMP, catches may be distributed differently than expected and may lead to realized fishing mortality rates that differ from those targeted. Since this option provides more flexibility in setting the sub-ACLs, when compared to Option 3 it should have less impact on scallop resources. Whether it has more or less impact than Option 2 depends on how accurate the estimates are. Since under Option1 No Action the sub-ACL is not usually modified for two years, it may have more impacts on the scallop resource than Option 2 if the estimates are not accurate.

This measure would not be expected to have measureable impacts on other species.

7.1.1.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified as 90 percent of the Estimated Catch

Impacts on regulated groundfish

Under this option, the amount of GB yellowtail flounder allocated to the scallop fishery is determined when groundfish and scallop fishery specifications are set. While this is similar to Option 1, the difference is that this option would specify that the allocation is 90 percent of the amount the scallop fishery is expected to catch, and this amount will change (up or down) as new information is developed. The adjustment, if needed, is planned to occur annually. This adjustment feature means that it is more likely the sub-ACL will reflect recent conditions in both fisheries.

From the standpoint of GB yellowtail flounder fishing mortality, this is primarily an allocation decision and as long as the catch of each fishery is limited to its allocation it should have minimal biological effects. This general concept, however, needs to be examined in the context of the existing management measures. The structure of the management measures – specifically the AMs - for the scallop and groundfish fisheries differ. While there are measures in place that control groundfish fishery in-season catches (for example, sector catch monitoring, common pool in-season measure adjustments), the scallop fishery catches of yellowtail flounder are not similarly limited by in-season measures. If there is an overage of a sub-ACL, the scallop AMs control catches in future years. Generally, the timing is such that ana overage in year 1 is likely to lead to AMs in year 3. For this reason, if the allocation to the scallop fishery is much less than the expected catch, the risk of overfishing increases in year 1 and year 2.

When compared to the other options, however, the effects on fishing mortality may be different. Option 1 No Action does not specify a specific amount for the scallop fishery and does not establish an automatic adjustment to the allocation. As a result, if the estimates are not accurate when the sub-ACLs are set, the effect on fishing mortality under Option 1 No Action are less certain and are less predictable. Since Option 2 does provide for an adjustment process each year (that is, Option 2 requires that the estimate of scallop fishery catches of yellowtail flounder to be updated annually and the allocation adjusted if necessary) , it is more likely the sub-ACL will reflect actual conditions in the fishery, overfishing will not occur, and realized fishing mortality will be closer to what is expected. Because Option 3 ignores currert conditions and scallop management measures and sets the allocation at a fixed percentage of the ACL, Option 2 is less likely to result in overfishing than Option 3.

A concern with this option is that it does not allocate the exact amount the scallop fishery is expected to catch, but instead allocates only 90 percent of that amount. The estimates of scallop fishery catches of GB yellowtail flounder are subject to uncertainty. Uncertainty over changes in scallop and yellowtail flounder biomass, uncertainty over future fishing activity, and uncertainty over discard rates all affect the estimates, and any point estimate of catches will have a distribution around it. The option does not specify what the basis will be for the calculation. If the calculation is based on the point estimate of the expected catch, and this estimate is unbiased, then the expectation would be that in some years the scallop fishery will exceed its sub-ACL. In those instances there may be an increased risk that overfishing will occur if other fisheries catch their entire allocation.

This measure is not likely to have direct impacts on other groundfish stocks, and does not differ from either Option 1 No Action or Option 3 in that regard.

Impacts on other species

The primary indirect impact of this measure is on the scallop resource in the GB area; it would not affect the scallop resource in the SNE area because Option 2 only changes the way the allocation is determined for GB yellowtail flounder. Scallop fishing activity can be limited if the sub-ACL is exceeded. The AM can limit scallop fishing activity in certain areas, and as a result effort can shift to other areas. If this is not planned for by the scallop FMP, catches may be distributed differently than expected and may lead to realized fishing mortality rates that differ from those targeted. Since this option provides more flexibility in setting the sub-ACLs, when compared to Option 3 it should have less impact on scallop resources. It should also have less impact on Option 1 No Action because the allocation is adjusted each year, if necessary, to account for current stock conditions and fishing activity.

This measure would not be expected to have measureable impacts on other species.

7.1.1.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History *(Preferred Alternative)*

Impacts on regulated groundfish

This option would establish a fixed percentage of the GB yellowtail flounder ABC that would be allocated to the scallop fishery. The percentage would be defined as 40 percent of the U.S. ABC in FY 2013, and 16 percent in subsequent years. Under this option, there is less consideration of current conditions and fishing activity when specifying the allocation than is the case with either Option 1 No Action or Option 2. From the standpoint of GB yellowtail flounder fishing mortality, this is primarily an allocation decision and as long as the catch of each fishery is limited to its allocation it should have minimal biological effects. The structure of the management measures for the scallop and groundfish fisheries differ. While there are measures in place that control groundfish fishery in-season catches, the scallop fishery catches are not similarly limited. If there is an overage of a sub-ACL, the scallop AMs attempt to control catches in future years. For this reason, if the allocation to the scallop fishery is much less than the expected catch, the risk of overfishing increases.

When compared to the other options, however, the effects on fishing mortality may be different. Because this option does not consider planned scallop fishing activity, compared to either Option 1 No Action or Option 2 there is a greater risk that the allocation will not reflect the expected catch of GB yellowtail flounder by the scallop fishery. In those cases where the allocation is less than the expected catch, there is a greater risk that overfishing will occur. If the opposite is true, then the fishing mortality rate would be lower than expected. For these reasons, this option imposes greater risk that the targeted fishing mortality for this stock will not be realized. And it is more likely that this will occur in years when the GB access areas are open, since GB yellowtail flounder catches by the scallop fishery typically increase in those years.

This measure is not likely to have direct impacts on other groundfish stocks, and does not differ from either Option 1 No Action or Option 2 in that regard. While all of the allocation options reduce the amount of GB yellowtail flounder available to the groundfish fishery, as long as catches are adequately controlled they should not lead to changes in fishing mortality. It is possible, however, that because this stock is caught in concert with other species, a low allocation to the groundfish fishery may limit catches of other species and as a result may lead to reduced fishing mortality for other GB groundfish stocks.

Impacts on other species

The primary indirect impact of this measure is on the scallop resource in the GB area; it would not affect the scallop resource in the SNE area because Option 3 only changes the way the allocation is determined for GB yellowtail flounder. Scallop fishing activity can be limited if the sub-ACL is exceeded. The AM can limit scallop fishing activity in certain areas, and as a result effort can shift to other areas. If this is not planned for by the scallop FMP, catches may be distributed differently than expected and may lead to realized fishing mortality rates that differ from those targeted. Since this option provides less flexibility in setting the sub-ACLs, when compared to either Option 1 No Action or Option 2 it should have more impact on scallop resources.

This measure would not be expected to have measureable impacts on other species.

7.1.1.4 Small Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

7.1.1.4.1 Option 1: No Action

Impacts on regulated groundfish

This measure would not adopt a small-mesh fishery sub-ACL for GB yellowtail flounder. Catches by these fisheries woud be accounted for as part of the "other –sub-components" portion of the overall ACL. As such, there would not be any direct controls on catches of GB yellowtail flounder by small-mesh fisheries. Catches by these fisheries have ranged from 26 mt to 110 mt during the period 2004 through 2011. Should the overall ACL decline in future years, this catch could be a substantial portion of overall removals, and the lack of a control on these catches could lead to overfishing if they are not correctly estimated. As a result, when compared to Option 2, this option would have an increased risk of overfishing GB yellowtail flounder.

Impacts on other species

This option would not be expected to have any direct biological 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.

7.1.1.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder *(Preferred Alternative)*

Impacts on regulated groundfish

This measure would adopt a small-mesh fishery sub-ACL for GB yellowtail flounder. Catches of this stock by small-mesh vessels would be subject to an AM if they exceeded the sub-ACL. As a result, there would be more certainty that catches would be controlled and overfishing would be less likely to occur than would be the case with Option 1 No Action. While the actual AM would be adopted in a later action, it is also possible that the AM might be an in-season or pro-active AM that would make it unlikely that catches by small-mesh fisheries would exceed the sub-ACL in even one year, making it less likely that overfishing would occur.

Impacts on other species

This measure could reduce catches of species caught on small-mesh trips, primarily squid and whiting. This is because the sub-ACL will have an associated AM. If the AM is triggered because the sub-ACL is exceeded, it may restrict fishing activity on GB and lead to reduced catches of squid and whiting. Whether this will occur will depend on the specific design of the AM and whether the sub-ACL is exceeded. When compared to Option 1 No Action, there is a chance this measure would lead to reduced fishing mortality on small-mesh species.

7.1.2 Commercial and Recreational Fishery Measures

7.1.2.1 Management Measures for the Recreational Fishery

7.1.2.1.1 Option 1: No Action

Impacts on regulated groundfish

The direct effects of this option would primarily fall on GOM cod and GOM haddock, the two stocks that are specifically allocated to the recreational groundfish fishery and subject to AMs. This option would not change the AMs for the recreational fishery. The existing recreational AMs only allow the Regional Administrator to make measures more strict after a sub-ACL has been exceeded. These reactive AMs would not provide a mechanism to adjust recreational measures in advance of a decline in the sub-ACL. In essence, unless a Council action modified recreational measures, recreational catches would exceed the sub-ACL before a change was made as required by the AMs, increasing the risk of overfishing. The current AMs also do not allow recreational measures to be relaxed if it is likely that catches will fall short of the sub-ACL.

If this option was adopted, the recreational measures for GOM cod catches would remain a 24 inch minimum size and a ten fish bag limit. GOM haddock catches would be limited to a 19 inch minimum size and no bag limit. Based on a model that was developed to evaluate proposed recreational measures, the catch of GOM cod in FY 2013 would probably be more than two million pounds, or 907 mt. This amount of catch would exceed the low sub-ACL for this stock proposed in FW 50, but would be less than the highest sub-ACL.

When compared to Option 2, this option has a greater risk of recreational catches exceeding the sub-ACL for GOM cod and GOM haddock, particularly if the sub- ACL is declining from one year to the next. While it is possible that measures could be adjusted when the new sub-ACLs are defined, there is no guarantee that such an action will be completed in time. For other groundfish stocks, the implications are less clear. There is no specific allocation to the recreational fishery for stocks such as GOM winter flounder and pollock, so this measure will not have direct effects on those stocks. It could have indirect impacts, however, as these species are caught groundfish trips and to the extent the lack of a proactive AM allows more trips to occur, recreationalcatches of these stocks could increase when compared to Option 2.

Impacts on other species

This option is not expected to have direct impacts on non-groundfish species, and is not likely to differ from Option 2 in that regard. If AMs are triggered for GOM cod or GOM haddock, it is possible that recreational fishermen will choose to target other species (for example, striped bass) rather than take groundfish fishing trips. These species, however are all subject to their own management programs and regulations could be adjusted if necessary to prevent overfishing.

7.1.2.1.2 Option 2: Revised Accountability Measure for the Recreational Fishery *(Preferred Alternative)*

Impacts on regulated groundfish

If this measure is implemented, the Regional Administrator would be authorized to adjust recreational measures as necessary in order to prevent the sub-ACL from being exceeded, or to allow it to be harvested. This measure modifies the current AM by adding the ability for it to be used in a proactive manner, prior to a sub-ACL overage. As a result it would help to reduce the possibility of recreational catches exceeding a sub-ACL, and by doing so reduces the risk of overfishing. When compared to Option 1 No Action, this measure should benefit groundfish stocks because it allows for a proactive adjustment to recreational fishing measures even in the absence of a Council action. At present, the benefits of this measure apply primarily to the two stocks with a specific recreational fishery sub-ACL, GOM haddock and GOM cod.

This measure may have indirect effects on other groundfish stocks caught by recreational fishermen, such as pollock and GOM winter flounder. These impacts are difficult to predict. For example, if measures are made more restrictive for GOM cod, recreational fishermen may increase targeting of pollock in response. In the short term, however, catches of pollock and GOM winter flounder are well below the ACL and any increase in recreational catches is not expected to threaten mortality targets. The proactive AM could also reduce the number of groundfish trips, which might reduce catches of these other species as well when compared to Option 1 No Action.

Impacts on other species

This option is not expected to have direct impacts on non-groundfish species, and is not likely to differ from Option 1 No Action in that regard. If measures are adjusted for GOM cod or GOM haddock, it is possible that recreational fishermen will choose to target other species (for example, striped bass) rather than take groundfish fishing trips. These species, however are all subject ot their own management programs and regulations could be adjusted if necessary to prevent overfishing.

7.1.2.2 Groundfish Monitoring Program Revisions

7.1.2.2.1 Option 1: No Action Impacts on regulated groundfish

If this option is adopted, the ground monitoring program would not be revised. The existing program has resulted in the discard estimates and CVs specified in Section 6.5.12.1.1. Under the current regulations, however, there would be changes in the monitoring program that would occur in FY 2013. All sector ASM coverage would be funded by industry observers, and DSM would be required for 20 percent of all trips (also funded by industry). The specific level of ASM coverage that would be implemented would be determined and established by NMFS, and would at a minimum be sufficient to meet the CV standard required by the SBRM. While this would not have direct impacts on fishing mortality or biomass of groundfish stocks, the level of monitoring coverage could affect the accuracy of catch estimates. If the accuracy of catch estimates changes, then the ability to assess groundfish stocks might also change.

There are specific elements of the No Action alternative that might be revised if other options are adopted. The biological impacts of the No Action alternatives comapred to these options are discussed below.

The Option 1 No Action alternative would not modify the goals and objectives of the monitoring program. These are not well defined under existing actions and this has led to confusion about the implementation of electronic monitoring programs, goals for ASM coverage, etc. While this option would not have any direct biological impacts, the lack of clear goals has hampered improving the monitoring system and could lead to a less effective program. This could adversely affect the understanding of stock status when compared to Option 2, which would modify the goals and objectives.

Option 1 No Action would leave the application of the CV standard to observed trips undefined. This means the level of observer coverage is difficult to predict because the coverage needed to meet the CV standard depends on how the standard is applied. Generally, lower numbers of trips need to be observed if the standard is applied at a more coarse level of stratification. Whether this would lead to more accurate discard estimates than Option 3 Sub-Option A depends on which sub-option is selected and how the CV standard is applied. When compared to Option 3, sub-option A1, the current interpretation of the No Action alternative would provide more observer coverage. That is because NMFS is applying the standard to most, but not all, individual strata. When compared to Sub-Option 3 A2, the No Action alternative would probably result in lower levels of observer coverage, as the alternative would apply the standard at the sector/stock level. Thus, No Action might lead to more accurate catch estimates than sub-opiont 3A1, but less accurate catch estimates than sub-option 3A2.

This option would keep the requirement that the industry fund ASM in FY 2013. The exact level of coverage that would be required is not yet specified but would presumably be similar to the ~17 percent of trips that was required in FY 2012 (an additional 18 percent of trips were expected to be covered by NEFOP observers). This level of coverage is adequate to provide accurate catch estimates for assessment purposes, resulting in accurate estimates of fishing mortality and stock size. There would not likely be any difference in the biological impacts between this option and sub-option 3B.

There would not be any differences in observer coverage levels for sector ELM sink gillnet trips in SNE if this option is selected, and the coverage level on those trips would be the same as on other sector trips. This would probably lead to more precise estimates of the catch of groundfish species on these trips when compared to sub-option 3C. However, this comes at a cost as there is usually little groundfish catch on these trips and a precise estimate of a small amount is not particularly useful. The ASM coverage spent on these trips would not be available to be used on other trips that may catch more groundfish and could lead to less precise estimates of groundfish on the other trips. If a fixed amount of money is spent on ASM coverage, this option might lead to slightly less precise estimates of discards in the groundfish fleet overall when compared to sub-option 3B, and this may lead to slightly less accurate estimates of fishing mortality and stock size as a result. Any differences are likely to be minor, however, given the number of sector trips of this type. In FY 2010, there were 546 sector sink gillnet ELM trips in the SNE/MA area, and in FY 2011 there 775 such trips. 114 trips were observed in FY 2010 and 161 were observed in FY 2011, for a coverage rate of 21 percent of trips. This accounts for about 1 percent of observed sector trips in each year, so it is not likely that there would be alrge differences in the precision of discard estimates between this option and sub-option 3 C.

Unlike Option 4, this option would continue to require that industry fund all at-sea monitoring costs in FY 2013 and beyond. This would increase the financial burden on the industry. While this is primarily an administrative measure and would not be expected to have direct effects on groundfish fishing mortality or stock size, it could have indirect effects if this measure results in less monitoring coverage because industry cannot afford the required level of coverage. How this would affect the fishery is not clear .This might result in lower coverage rates and less precise information that would create additional uncertainty about the estimates of stock size and fishing mortality; this would occur only if fishing was allowed to continue in spite of lower observer coverage rates. Alternatively, fishing might be restricted to the amount that can be adequately monitored, which would probably reduce fishing activity and lead to lower fishing mortality rates and more rapid rebuilding when compared to Option 4.

Impacts on other species

Option 1 No Action would not be expected to have direct effects on fishing mortality of other species. It could, however, have indirect effects on those species that are caught on groundfish fishing trips - primarily monkfish, skates, and spiny dogfish. When compared to the alternatives that are being considered, the impacts on these species would probably be parallel to the impacts described for groundfish stocks. For example, if the industry remains responsible for all ASM costs in FY 2013 and beyond, and observer coverage declines as a result, the precision of discard estimates for non-groundfish species caught on groundfish fishing trips would also probably decline when compared to Option 4.

7.1.2.2.2 Option 2: Monitoring Program Goals and Objectives

Impacts on regulated groundfish

This option would clarify the goals and objectives of the monitoring program adopted for sectors. As such, it is primarily an administrative measure and is not expected to have direct biological impacts on any regulated groundfish stock. The clarification of goals could lead to indirect effects, however. If the revised goals and objectives result in more accurate catch estimates, it may lead to more accurate assessments and setting of catch levels than is the case under Option 1 No Action. Such effects are difficult to predict or estimate.

This option is not directly comparable to Options 3 and 4, which address specific elements of the ASM program. When compared to Option 1 No Action, this option would improve the ability to manage the monitoring program so that it meets specific goals and objectives, but would not be expected to have direct biological effects that are different than Option 1 No Action.

Impacts on other species

This option would not be expected to directly affect fishing mortality for non-groundfish species. It is possible that if this option leads to an improved monitoring system that results in better catch estimates, the assessment of other species may benefit in the same manner as groundfish species. If the revised goals and objectives result in more accurate catch estimates, it may lead to more accurate assessments and setting of catch levels than is the case under Option 1 No Action. Such effects are difficult to predict or estimate.

7.1.2.2.3 Option 3: ASM Coverage Levels *(Preferred Alternative)*

This option would modify the criteria for determining the coverage level needed for ASM of sector vessels. There are two elements to this option. First, the option specifies an overall philosophy for ASM. Second, the option considers two different approaches for determining the required coverage level. The biological impacts of these elements are discussed below.

This option explicitly recognizes that adequate ASM coverage of sector trips must meet an acceptable level of accuracy as well as an acceptable level of precision. Accuracy can be defined as the closeness of a measured or estimated value to its actual value; precision is a measure of how closely repeated samples will agree to one another (NEFMC 2007, SBRM amendment). Both are important. A precise estimate may not be useful if it is biased; similarly, an accurate estimate that has wide error bounds (i.e. is imprecise) may not be repeatable and any given estimate may vary considerably from the true value.

The relative importance of precision and accuracy can be examined by considering their interaction with each other at different levels of catch and when discards are at different levels of nominal catch. With respect to sector catches of groundfish stocks, one goal of ASM is to be certain that when nominal catches (landings and discards) are less than the ACE allocated to a sector, actual catches are unlikely to exceed that ACE. When compared to Option 1 No Action, this option adds the requirement that accuracy be considered when determining coverage levels. Option 1 No Action would maintain the standard adopted by Amendment 16, which specifies a specific precision standard and allows for consideration of other factors but does not clearly state what those other factors might be.

The sector and stock-specific CV of discard estimates can be used to characterize the likelihood that the actual catches exceed a sector's ACE. The following discussion uses these assumptions:

- Landings are known without error. This assumption could be relaxed if information is available on the uncertainty surrounding landings.
- Discard estimates are unbiased. This assumption will be modified in a subsequent discussion.
- Discard estimates are normally distributed random variables.

CV is normally defined as the standard deviation (SD) of an estimate divided by the mean of the estimate. In the SBRM framework, however, CV is defined as the standard error of the estimate divided by the estimate (NEFMC 2007). CV is a dimension-less value. If the CV and point estimate of the discards are known, then the SE can be determined as:

CV= SE of the estimate/ estimate
CV * estimate = SE

This relationship allows creation of a confidence interval around any discard estimate. The interval that is plus/minus 1.96 * SE of the estimate will cover 95 percent of the distribution. There is a 97.5 percent probability that the discard estimate will be equal to or less than the mean plus 1.96 times the SE. With discards at a given proportion of the catch, the SE can be used to determine the upper bound of the confidence interval, shown in Figure 140.

Any discard estimate can be expressed as a proportion of a sector's nominal catch (landings plus the discard estimate); landings can also be expressed as a proportion of the nominal catch. If, as assumed, landings are known without error and the discard estimate is unbiased, then the CV of the discard estimate can be used to calculate a catch that has a 97.5 percent probability of being less than or equal to the actual catch:

$$Catch_{98\ pct} = \text{Landings} + \text{Discards} + (\text{Discards} * 1.96 * \text{CV})$$

The result of this formula will always be equal to or greater than 1, because both landings and discards are being expressed as a proportion of catch. The catch increases as discards increase and CV increases. Results are shown in Table 67.

At what point does the $Catch_{UpperCI}$ exceed the sector's ACE? This would occur when the actual catch, as a proportion of the ACE, exceeds 1. This can be determined for each cell in Table 2 by dividing 1 by the $Catch_{UpperCI}$. This gives the nominal catch, as a proportion of ACE, above which the sector ACE may be exceeded for a given discard rate and CV. This ACE is referred to as ACE_{max}.The results are shown in Table 68.

This analysis assumes that the discard estimates are unbiased. The effect of a bias on the maximum nominal catch can also be explored. By assuming that there is a bias in the discard rates on unobserved trips, a different ACE_{max} can be determined. If discard estimates are biased then nominal catches need to be lower to have a high probability that the ACE is not exceeded. The CV of the discard estimate also becomes more important, as can be seen from Figure 141. If discard estimates are not biased, changing the CV of the discard estimate from 0.55 to 0.3 only increases the ACE_{max} by 4.1 percent. If the discards are under-estimated by a factor of 2, then a similar change in CV increases the ACE_{max} by 6.1 percent . Put another way, if discard estimates are not biased, then at a discard rate of 10 pct of the catch, reducing the CV by 5 percent increases ACE_{max} by about 0.9 percent. If discards are biased and nominal discards are the same, then improving the CV by 5 percent increases ACE_{max} by about 1.4 percent (with a range of 1.1 percent to1.6 percent for CVs of 0.55 to 0).

This exploration of the effect of a bias in the discard rate on unobserved trips illustrates the interaction between catch (as a percentage of ACE allocated), discard rates, CV, and bias. From the standpoint of increasing ACE_{max}, the most important factors would be discards as a percent of catch and bias, and not CV. At the levels of discards that have been observed for most allocated groundfish stocks (see Section 6.5.12.1.1), a change in CV has relatively little effect on the difference between nominal catch and the true catch. The more important factor is bias of the discard rate on unbserved trips.

This exploration indicates why an ASM coverage standard should consider accuracy as well as CV. Focusing solely on CV could lead to two problems. First, in some cases it may take a large number of trips to achieve the desired CV on a small amount of discards, which would not be cost effective. This is examined further in a following section. Second, considering CV without addressing accuracy may lead to estimates that are biased.

Figure 140 – Discards plus 1.96* SE of discards as a percent of catch

	CV											
Nominal Discards as Pct of Catch	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.050	0.055	0.060	0.065	0.070	0.075	0.079	0.084	0.089	0.094	0.099	0.104
0.1	0.100	0.110	0.120	0.129	0.139	0.149	0.159	0.169	0.178	0.188	0.198	0.208
0.15	0.150	0.165	0.179	0.194	0.209	0.224	0.238	0.253	0.268	0.282	0.297	0.312
0.2	0.200	0.220	0.239	0.259	0.278	0.298	0.318	0.337	0.357	0.376	0.396	0.416
0.25	0.250	0.275	0.299	0.324	0.348	0.373	0.397	0.422	0.446	0.471	0.495	0.520
0.3	0.300	0.329	0.359	0.388	0.418	0.447	0.476	0.506	0.535	0.565	0.594	0.623
0.35	0.350	0.384	0.419	0.453	0.487	0.522	0.556	0.590	0.624	0.659	0.693	0.727
0.4	0.400	0.439	0.478	0.518	0.557	0.596	0.635	0.674	0.714	0.753	0.792	0.831
0.45	0.450	0.494	0.538	0.582	0.626	0.671	0.715	0.759	0.803	0.847	0.891	0.935
0.5	0.500	0.549	0.598	0.647	0.696	0.745	0.794	0.843	0.892	0.941	0.990	1.039
0.55	0.550	0.604	0.658	0.712	0.766	0.820	0.873	0.927	0.981	1.035	1.089	1.143
0.6	0.600	0.659	0.718	0.776	0.835	0.894	0.953	1.012	1.070	1.129	1.188	1.247
0.65	0.650	0.714	0.777	0.841	0.905	0.969	1.032	1.096	1.160	1.223	1.287	1.351
0.7	0.700	0.769	0.837	0.906	0.974	1.043	1.112	1.180	1.249	1.317	1.386	1.455
0.75	0.750	0.824	0.897	0.971	1.044	1.118	1.191	1.265	1.338	1.412	1.485	1.559
0.8	0.800	0.878	0.957	1.035	1.114	1.192	1.270	1.349	1.427	1.506	1.584	1.662
0.85	0.850	0.933	1.017	1.100	1.183	1.267	1.350	1.433	1.516	1.600	1.683	1.766
0.9	0.900	0.988	1.076	1.165	1.253	1.341	1.429	1.517	1.606	1.694	1.782	1.870
0.95	0.950	1.043	1.136	1.229	1.322	1.416	1.509	1.602	1.695	1.788	1.881	1.974
1	1.000	1.098	1.196	1.294	1.392	1.490	1.588	1.686	1.784	1.882	1.980	2.078

Table 67 – Landings plus discards plus 1.96 times SE of discards as a percent of catch

	CV											
Landings as Pct of Catch	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
0.95	1.000	1.005	1.010	1.015	1.020	1.025	1.029	1.034	1.039	1.044	1.049	1.054
0.9	1.000	1.010	1.020	1.029	1.039	1.049	1.059	1.069	1.078	1.088	1.098	1.108
0.85	1.000	1.015	1.029	1.044	1.059	1.074	1.088	1.103	1.118	1.132	1.147	1.162
0.8	1.000	1.020	1.039	1.059	1.078	1.098	1.118	1.137	1.157	1.176	1.196	1.216
0.75	1.000	1.025	1.049	1.074	1.098	1.123	1.147	1.172	1.196	1.221	1.245	1.270
0.7	1.000	1.029	1.059	1.088	1.118	1.147	1.176	1.206	1.235	1.265	1.294	1.323
0.65	1.000	1.034	1.069	1.103	1.137	1.172	1.206	1.240	1.274	1.309	1.343	1.377
0.6	1.000	1.039	1.078	1.118	1.157	1.196	1.235	1.274	1.314	1.353	1.392	1.431
0.55	1.000	1.044	1.088	1.132	1.176	1.221	1.265	1.309	1.353	1.397	1.441	1.485
0.5	1.000	1.049	1.098	1.147	1.196	1.245	1.294	1.343	1.392	1.441	1.490	1.539
0.45	1.000	1.054	1.108	1.162	1.216	1.270	1.323	1.377	1.431	1.485	1.539	1.593
0.4	1.000	1.059	1.118	1.176	1.235	1.294	1.353	1.412	1.470	1.529	1.588	1.647
0.35	1.000	1.064	1.127	1.191	1.255	1.319	1.382	1.446	1.510	1.573	1.637	1.701
0.3	1.000	1.069	1.137	1.206	1.274	1.343	1.412	1.480	1.549	1.617	1.686	1.755
0.25	1.000	1.074	1.147	1.221	1.294	1.368	1.441	1.515	1.588	1.662	1.735	1.809
0.2	1.000	1.078	1.157	1.235	1.314	1.392	1.470	1.549	1.627	1.706	1.784	1.862
0.15	1.000	1.083	1.167	1.250	1.333	1.417	1.500	1.583	1.666	1.750	1.833	1.916
0.1	1.000	1.088	1.176	1.265	1.353	1.441	1.529	1.617	1.706	1.794	1.882	1.970
0.05	1.000	1.093	1.186	1.279	1.372	1.466	1.559	1.652	1.745	1.838	1.931	2.024
0	1.000	1.098	1.196	1.294	1.392	1.490	1.588	1.686	1.784	1.882	1.980	2.078

Table 68 - Maximum Nominal Catch Where Actual Catch < ACE With a Probability of 97.5 pct

	CV											
Discards as Pct of Catch	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55
0	1	1	1	1	1	1	1	1	1	1	1	1
0.05	1	0.995	0.990	0.986	0.981	0.976	0.971	0.967	0.962	0.958	0.953	0.949
0.1	1	0.990	0.981	0.971	0.962	0.953	0.944	0.936	0.927	0.919	0.911	0.903
0.15	1	0.986	0.971	0.958	0.944	0.932	0.919	0.907	0.895	0.883	0.872	0.861
0.2	1	0.981	0.962	0.944	0.927	0.911	0.895	0.879	0.864	0.850	0.836	0.823
0.25	1	0.976	0.953	0.932	0.911	0.891	0.872	0.854	0.836	0.819	0.803	0.788
0.3	1	0.971	0.944	0.919	0.895	0.872	0.850	0.829	0.810	0.791	0.773	0.756
0.35	1	0.967	0.936	0.907	0.879	0.854	0.829	0.806	0.785	0.764	0.745	0.726
0.4	1	0.962	0.927	0.895	0.864	0.836	0.810	0.785	0.761	0.739	0.718	0.699
0.45	1	0.958	0.919	0.883	0.850	0.819	0.791	0.764	0.739	0.716	0.694	0.673
0.5	1	0.953	0.911	0.872	0.836	0.803	0.773	0.745	0.718	0.694	0.671	0.650
0.55	1	0.949	0.903	0.861	0.823	0.788	0.756	0.726	0.699	0.673	0.650	0.628
0.6	1	0.944	0.895	0.850	0.810	0.773	0.739	0.708	0.680	0.654	0.630	0.607
0.65	1	0.940	0.887	0.840	0.797	0.758	0.723	0.692	0.662	0.636	0.611	0.588
0.7	1	0.936	0.879	0.829	0.785	0.745	0.708	0.676	0.646	0.618	0.593	0.570
0.75	1	0.932	0.872	0.819	0.773	0.731	0.694	0.660	0.630	0.602	0.576	0.553
0.8	1	0.927	0.864	0.810	0.761	0.718	0.680	0.646	0.615	0.586	0.561	0.537
0.85	1	0.923	0.857	0.800	0.750	0.706	0.667	0.632	0.600	0.572	0.546	0.522
0.9	1	0.919	0.850	0.791	0.739	0.694	0.654	0.618	0.586	0.557	0.531	0.508
0.95	1	0.915	0.843	0.782	0.729	0.682	0.642	0.605	0.573	0.544	0.518	0.494
1	1	0.911	0.836	0.773	0.718	0.671	0.630	0.593	0.561	0.531	0.505	0.481

Figure 141 – Effects of discard bias on maximum catch (as a percent of ACE) such that there is a high probability that true catch does not exceed allocated ACE. Nominal discards are assumed to be 10 percent of nominal catch. Lines indicate the maximum percent of ACE that can be caught (nominal landings plus discards) with a high probability that the allocated ACE is not exceeded.

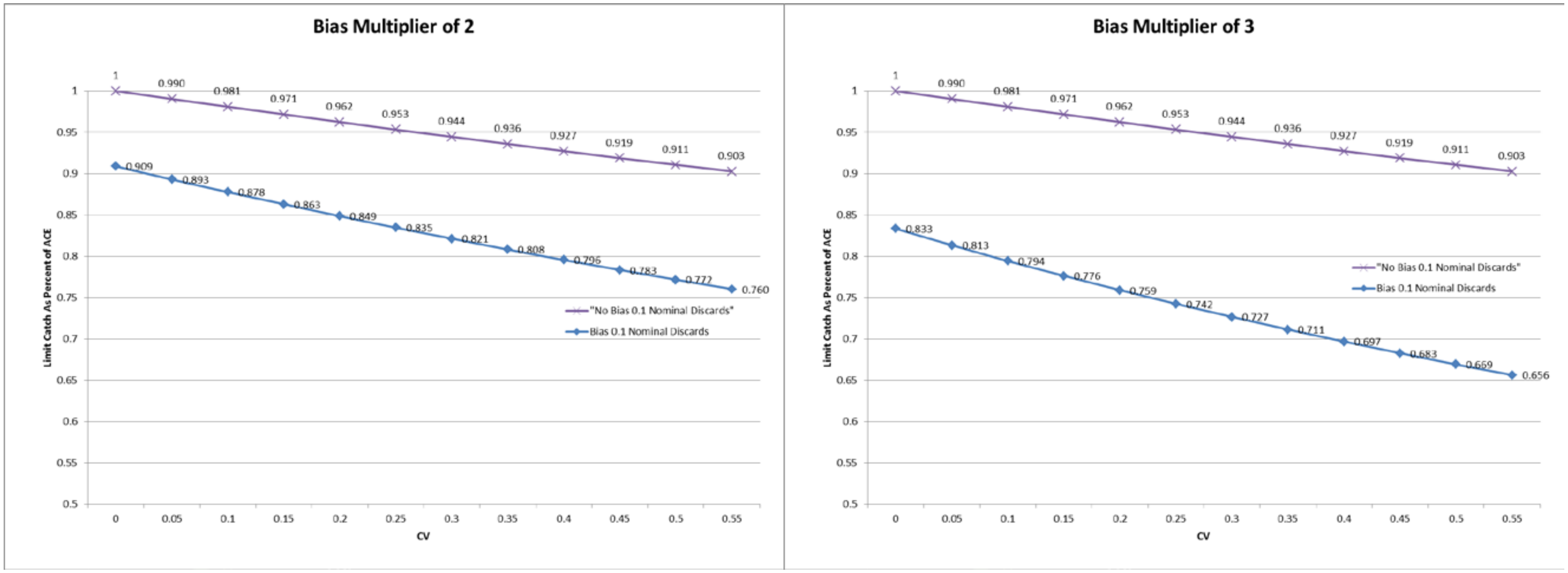


Figure 142 - Effects of discard bias on maximum catch (as a percent of ACE) such that there is a high probability that true catch does not exceed allocated ACE. Bias multiplier of 2, nominal discards are assumed to be a percent of nominal catch as shown. Lines indicate the maximum percent of ACE that can be caught (nominal landings plus discards) with a high probability that the allocated ACE is not exceeded.

<u>Sub-Option A: Clarification of CV Standard</u> *(Preferred Alternative)*

This sub-option would clarify the application of the CV standard for ASM of sector trips. Amendment 16 adopted the CV standard from the SBRM as a minimum standard that must be met by sector monitoring plans. The amendment was not clear on how this standard should be applied. If applied at the sector and stock level it leads to a different level of coverage than if applied to each stratum.

There are two sub-options under consideration. Sub-Option A1 would require that the CV standard be met for each stock allocated to sectors at the overall stock level. As a result, the minimum coverage level would be lower than under either the No Action option or Sub-Option A2. The precision of discard estimates would decline for individual sectors. Biological impacts of this measure would be the result of any increased variability in discard estimates that would result from the reduced ASM coverage levels. In the absence of monitoring effects, it is not likely that estimates of fishing mortality would be so different as to lead to undetected overfishing. If there are monitoring effects, however, lower ASM coverage levels could lead to larger biases in discard estimates and catches could be under-estimated.

Sub-Option A2 would apply the CV standard at the sector-stock level. This would lead to higher ASM coverage rates than under sub-option A1, but probably lower coverage rates than under the No Action alternative. Discard estimates would be more precise than under sub-option A1, but less precise than under the No Action alternative. If monitoring effects are present, there would probably be less bias in discard estimates under this sub-option than would be the case under sub-option A1, but more bias than under the No Action alternative.

It should be noted that under either sub-option, if there is evidence of monitoring effects the ASM coverage level may be set at a higher percentage of trips than is warranted just to meet the CV standard.

<u>Sub-Option B: Removal of Requirement for Industry-Funded At-Sea Monitoring for FY 2013</u>
(Preferred Alternative)

This option would limit ASM coverage to that amount that can be funded by NMFS in FY 2013. While the amount of ASM coverage that could be provided is not known with certainty, the expectation is that ASM coverage would probably range between about 8 percent of trips and approximately 30 percent of trips (the amount of coverage funded in FY 2010 and 2011). Biological effects would be due to the variability in the estimate of sector discards. At the high end of this range, observer coverage would be similar to that realized in FY 2010 and 2011, and targeted in FY 2012. Discard estimates would likely have the same degree of precision as shown in Table 47. At the low end of this range, some stocks would probably not meet the CV standard of 30 percent established by the SBRM. In the absence of monitoring effects, at the high end of this range there would not likely be biological impacts from this measure that differ from the No Action alternative. If coverage is at the low end of this range, discard estimates might not be as precise as under the No Action alternative. In the presence of monitoring effects, at the low end of this range the bias in discard estimates would probably be larger than would be the case under No Action, since fewer trips would be observed.

When compared to sub-option A, the high end of the coverage range (30 percent) would likely lead to more observed trips than if coverage rates were based solely on achieving a desired CV, without consideration of observer effects.

Sub-Option C: Lower coverage rates for sector trips on a Monkfish DAS in the SNE broad stock area using ELM sink gillnet gear

Impacts on regulated groundfish

This option would reduce the observer/ASM coverage rate for sector trips fishing in the SNE broad stock area when using ELM sink gillnet gear. The exact coverage rate would be determined by NERO. In FY 2010 and FY 2011, about 21 percent of these trips were observed. Reducing observer coverage rates on these trips would be expected to reduce the precision of discard estimates for regulated groundfish caught on these trips. These trips, however, caught very little regulated groundfish in FY 2010 and FY 2011 (Table 69). As a result the reduced precision on the discard estimates is unlikely to have a measureable effect on total catch estimates, and would be unlikely to result in revised estimates of fishing mortality or stock size when compared to Option 1 No Action.

One uncertaninty in this evaluation is how changes in stock size or future fishing behavior could affect groundfish catches. While groundfish catches could increase as stocks rebuild, or if these trips move into areas with more groundfish, the gear in use is not typically used to target regulated groundfish in this area and substantial increases are unlikely.

Table 69 – Catches by statistical area on sector sink gillnet ELM trips in the SNE/MA broad stock area. Weights are pounds, live weight. (Source: DMIS)

Fishing Year	AREA	Groundfish Landed	Groundfish Discards	TOTAL LANDED	Groundfish As Percent of Total Landings
2010	526	0	41	22,513	0.2%
	533	0	7	3,510	0.2%
	534	0	15	8,240	0.2%
	537	310	2,516	2,424,633	0.1%
	539	0	210	137,803	0.2%
	611	0	1	4,106	0.0%
	612	0	0	4,411	0.0%
	613	0	34	109,101	0.0%
	615	0	462	62,725	0.7%
	616	0	0	27,709	0.0%
	621	0	188	27,482	0.7%
	625	0	1,880	250,448	0.8%
	626	0	1,322	125,237	1.1%
2010 Total		310	6,675	3,207,919	0.2%
2011	526	0	50	30,819	0.2%
	537	874	6,856	3,301,226	0.2%
	539	22	99	119,417	0.1%
	611	0	7	3,215	0.2%
	612	0	718	154,745	0.5%
	613	1	646	216,605	0.3%
	615	0	19	4,481	0.4%
	621	2	9	11,769	0.1%
	625	0	999	229,036	0.4%
	626	0	583	230,533	0.3%
	631	0	5	6,854	0.1%
	637	0	5	6,448	0.1%
2011 Total		899	9,995	4,315,148	0.3%
Grand Total		1,209	16,670	7,523,066	0.2%

Impacts on other species

Reductions in observer coverage on specific trips that would be authorized by this measre would be expected to reduce the precision of discard estimates on other species caught on these trips. As shown in Table 69, most of the landings on these trips are other species. The primary species landed are various skate species and monkfish, accounting for over 99 percent of the landings on these trips in FY 2010 and FY 2011 (Table 70). Reductions in the observer coverage levels for these trips could result in increased uncertainty about discards, leading to increased uncertainty in estimates of stock size and fishing mortality. This may be an issue for skates, where discards are a large part of removals. Trip-specific discards are not available, however, so it is not possible to quantify the effect. It should be noted that while observer coverage rates may be lower on these trips than on other sector trips if this option is adopted, they would not be likely to be less than that needed to meet requirements for accuracy specified by the SBRM.

Table 70 – Primary landings by statistical area on sector sink gillnet ELM trips in the SNE/MA broad stock area. Weights are pounds, live weight. (Source: DMIS)

FISHING_YEAR	AREA	Skates	Monkfish
2010	526	4,256	18,257
	533	1,192	2,318
	534	6,200	2,040
	537	1,641,809	743,561
	539	111,621	26,182
	611	2,270	1,703
	612	1,090	3,321
	613	42,938	65,787
	615	13,920	45,626
	616	4,482	23,227
	621	8,175	19,307
	625	180,402	68,640
	626	67,985	55,916
2010 Total		2,086,340	1,075,885
2011	526	10,295	20,443
	537	2,179,432	1,077,217
	539	108,423	10,838
	611	304	2,889
	612	109,041	28,150
	613	113,238	102,220
	615	1,107	3,337
	621	11,736	23
	625	136,059	91,172
	626	97,202	129,652
	631	5,550	1,304
	637	3,609	2,839
2011 Total		2,775,995	1,470,084
Grand Total		4,862,335	2,545,969

7.1.2.2.4 Option 4: Industry At-Sea Monitoring Cost Responsibility *(Preferred Alternative)*

Impacts on regulated groundfish

This option would limit the responsibility of the industry to fund ASM coverage to the direct costs generated by the presence of an observer on a vessel. This is an administrative measure that would not be expected to have a direct effect on fishing mortality or stock size. It could, however, have indirect effects by affecting the number of groundfish fishing trips that are monitored by an ASM. If industry finances only part of observer/ASM costs, then another source must pay for the remainder. The likely source would be federal funding. The level of federal funding that would be available can change from year to year, making it difficult to predict whether this option would lead to more or less monitoring. When compared to Option 1 No Action, presumably a combination of industry and government funding should make more funds available than industry funding alone. If this proves to be the case, then this option might result in higher coverage rates than Option 1 No Action, which should lead to improved estimates of discards and more accurate catch estimates. Such conclusions are speculative without knowing the amount of federal funding that will be available in the future. In the absence of any federal funding (including no funding for the NEFOP program), for example, it may not be possible to provide any observers since industry would only cover part of the cost. Whether such a reslt would lead to uncertain discard estimates or reduced fishing activity is not clear.

Impacts on other species

The impacts of this measure on other species are likely to be the same as the impacts on regulated groundfish described above. There aren't likely to be direct effects on fishing mortality or stock size, but changes in the level of observer coverage that may result could affect catch estimates in a positive or negative manner when compared to Option 1 No Action.

7.1.2.3 Dockside Monitoring Requirements

7.1.2.3.1 Option 1: No Action

Impacts on regulated groundfish

This option would result in dockside monitoring requirements for sector trips resuming in FY 2013. At least 20 percent of all sector and common pool groundfish fishing trips would be monitored by dockside or roving monitors. This measure would not be expected to have direct biological impacts on any regulated groundfish stock. To the extent that this requirement improved the accuracy of catch information, it could lead to indirect biological impacts. More accurate landings data might lead to better assessments, improving the estimates of fishing mortality and stock size. It is not clear, however, that the level of coverage is sufficient to lead to a noticeable improvement in catch information. When compared to Option 2, however, it could lead to a marginal improvement in landings data.

Impacts on other species

This measure would not be expected to have any biological impacts on non-groundfish stocks. Dockside monitors only provide reports on groundfish stocks, so it is unlikely that catch information for non-groundfish species would improve. There would not be expected to be any difference between this option and Option 2.

7.1.2.3.2 Option 2: Elimination of Dockside Monitoring Requirement *(Preferred Alternative)*

Impacts on regulated groundfish

This option would eliminate the requirement that 20 percent of sector and common pool trips would be monitored by dockside or roving monitors. When comapred to Option 1 No Action, this measure may result in a marginal decrease in the quality of landings information. While this would not be expected to have any direct impacts on fishing mortality or stock size, it could lead to less accurate assessments of the stocks. It is not clear that the differences between this option and No Action would be detectable, because the No Action option does not monitor a large proportion of groundfish fishery trips.

Impacts on other species

This measure would not be expected to have any biological impacts on non-groundfish stocks. Dockside monitors only provide reports on groundfish stocks, so it is unlikely that catch information for non-groundfish species would improve. There would not be expected to be any difference between this option and Option 1.

7.1.2.4 Commercial Fishery Minimum Size Restrictions

7.1.2.4.1 Option 1: No Action

Impacts on regulated groundfish

This option would not make any changes to the minimum size requirements for regulated groundfish allocated to sectors. As discussed in section 7.1.2.4.3, minimum size requirements (coupled with gear requirements) in this fishery have been seen to affect the selectivity in the fishery. The impacts of such changes are described in detail in that section. If this measure would be adopted, the expectation is that the current selectivity patterns that have been observed would be likely to continue into the future. When compared to Option 2 or Option 3, this measure would be less likely to result in changes in yield per recruit, changes in status determination critieria, and rebuilding progress. Catches in the near-term would be more likely to be consistent with the selectivity assumptions used to calculate ACLs. Unlike Option 2 or Option 3, this measure would be less likely to result in reduced regulatory discards. As described in Section 6.5.12, a large proportion of discards are the result of the requirement to comply with minimum size limits and that proportion would not likely to change if the minimum size limits are not modified.

Impacts on other species

This option is not likely to have any direct biological impacts on other species. The measure would not change minimum size limits for regulated groundfish. When compared to Option 2 or Option 3, there are not likely to be any changes in behavior that would lead to direct biological impacts on species like skates, dogfish, and monkfish that are caught while fishing for groundfish.

7.1.2.4.2 Option 2: Changes to Minimum Size Limits *(Preferred Alternative)*

Impacts on regulated groundfish

This option would modify minimum size limits for many regulated groundfish species for both sectors and common pool vessels. The minimum size limits for cod, haddock, witch flounder, yellowtail flounder, plaice, winter flounder, and redfish would be reduced. The new minimum size limits are designed to reduce discards and also to be generally consistent with length where 50 percent of the fish are expected to be mature.

The possible biological impacts of this option are similar to Option 3, which would remove all minimum size limits for vessels. As discussed in detail in Section 7.1.2.4.3, the biological impacts of changing minimum size requirements are a function of whether the change leads to a different selectivity in the fishery. If the catch of small fish as a proportion of the total catch increases, then changes in yield per recruit, status determination criteria, and rebuilding progress could result. Under this option, these effects would likely not be of the same magnitude as those described for Option 3 in Section 7.1.2.4.3 because there would still be a minimum size limit that may discourage targeting small fish. When compared to Option 1 No Action, however, there would likely be reductions in yield per recruit, MSY, and slower rebuilding progress.

Impacts on other species

This option is not likely to have any direct biological impacts on other species. The measure would only change minimum size limits for regulated groundfish. It could, however, lead to indirect impacts if fishermen change behavior to target smaller regulated groundfish and this leads to changes in the catch of species that are incidentally caught while doing so. It is not possible to predict the direction or magnitude of those changes, but the species that might be affected include the various skate species, dogfish, and monkfish that are often caught on groundfish trips. It is not clear if these impacts will be different than those of Option 1 No Action; they are likely to be similar, if lesser in magnitude, to the impacts that could occur under Option 3.

7.1.2.4.3 Option 3: Full Retention

Impacts on regulated groundfish

This option would eliminate minimum size limits for all regulated groundfish species allocated to sectors, and would require sector vessels to retain all allocated regulated groundfish species that are caught.

There are two primary ways that regulations can prevent full retention of fish that are caught: through the use of size limits (which can include minimum size limits or slot limits that restrict landings to a range of sizes) and through the use of possession limits.

The Northeast Multispecies FMP specifies minimum size limits for cod, haddock, yellowtail flounder, winter flounder, witch flounder, plaice, redfish, pollock, and halibut. Minimum size limits are not specified for white hake, wolffish, ocean pout, or windowpane flounder (three of these species cannot be landed under present regulations). Common pool vessels are subject to possession limits for several stocks. The FMP can modify these minimum size limits and possession limits through a framework adjustment or an amendment. The Northeast Multispecies FMP cannot require full retention of species managed in other FMPs (monkfish, skates, dogfish, etc.).

When minimum size limits were adopted in the original FMP (1986), it was considered the principal management measure in the management program. It was intended to direct the fishery away from immature fish and focus the catch on fish that have already contributed to the spawning potential of the stocks (NEFMC 1985). The appropriate minimum size was established based on the average length of fish at sexual maturity “and other factors which may include commercial considerations.” These other factors included the mixed nature of the fishery, the mortality of sub-legal fish caught in the net and impacts on discards. Minimum sizes that were adopted included 17 inches for cod, haddock, and pollock, 14 inches for witch flounder, 12 inches for yellowtail flounder and plaice, and 11 inches for winter flounder. Minimum sizes for cod, haddock, pollock, witch flounder, and winter flounder were scheduled to increase in year 2 of the plan. This schedule was later modified. The link between minimum fish size and mesh selectivity was recognized, and planned increases in the minimum mesh size were included. These mesh size increases were later delayed.

Amendment 5, in addition to adopting a permit moratorium and effort controls, made a subtle change in the use of minimum mesh sizes and minimum fish sizes. Vessels retaining more than 500 pounds of groundfish were required to fish under an appropriate mesh regulation for the area fished. The minimum fish sizes for regulated species were supposed to be set at the length where 25 percent of the fish at minimum size would be retained, with the exception of winter flounder.

Over time, the mesh regulations were modified without corresponding changes to the minimum size requirements. While the regulations still include a provision that minimum sizes should be set at the length at which 25 percent of the regulated species would be retained, this has not been used to adjust minimum sizes since Amendment 7. For example, in Amendment 13 (2004) mesh changes were used to avoid additional DAS reductions and minimum sizes were not increased at the same time.

Possession limits no longer apply to sector vessels for allocated groundfish9, but they are still used for common pool vessels fishing under effort controls.

The combination of minimum size and mesh increases has affected the size of fish captured. The selectivity of several multispecies stocks has shifted to older fish as these regulations changed over time, generally consistent with the adoption of increased mesh sizes and minimum sizes (see, for example, stock assessments for GB cod, GOM cod, GB haddock, GOM haddock, and plaice). In at least one assessment (GOM cod, SARC 52), the shift in selectivity is partially credited with helping the stock sustain high fishing mortality rates over time. These shifts in selectivity have changed the yield-per-recruit values and biological reference points (such as F40).

Halliday and Pinhorn (2002) reviewed the scientific and technical basis for policies on the capture of small fish in North Atlantic groundfish fisheries. They note that these regulations are usually justified as a way to increase yields or to improve recruitment. An objective of increasing recruitment requires an assumption that there is a direct relationship between SSB and recruitment. This report is ambivalent about the utility of such regulations, noting that many of the presumed benefits may not be realized. This report, however, does not explicitly address the increases in yield per recruit realized with NE groundfish over time.

There is some evidence that selective fishing can lead to adverse changes in fish stocks that can make rebuilding difficult. Genetic and/or phenotypic changes have been documented in some fisheries stocks and attriubuted to selective fishing. As noted in a review of these issues by Fenburg and Roy (2008), the evidence of a direct link between selective fishing and these changes is difficult to discern because of the interaction of other effects (such as high fishing mortality). But it is possible that fishing on larger fish can lead to genetic changes in fish stocks that reduce yields and can make rebuilding more difficult. Fenbrug and Roy (2007) concludes that while there is a paucity of information for many species, "…it is quite clear that size –selective harvesting is having a negative effect on the population biology of many species…" Further, they conclude that reversing the negative effects of size-selective fishing "…would require us to stop preferentially removing the larger and older individuals in a population." While there are economic reasons that fishermen target larger fish, this option would remove a regulatory prohibition that prevents harvesting smaller fish.

The impacts of removing minimum size regulations are difficult to predict because of the interactions with minimum mesh regulations and other factors that affect selectivity (time and area fished, targeting behavior, etc.). Mesh size is only one factor that determines the selectivity of the fishery, but it is believed to be an important one. While it is sometimes argued that requiring full retention will merely convert discards to landings and not affect the catch at age, this assumption may not prove valid if profits can be increased by targeting smaller fish. This is explored further in a following section (see Section 7.4.3.3.3), and the conclusions are linked to this discussion.

If removing minimum fish sizes leads to a change in fishing behavior such that smaller fish are increasingly selected by the fishery, then there will be changes in the yield per recruit (YPR) and biological reference points (including Fmsy and SSB_{MSY} or their proxies). Other possible impacts include effects on recruitment if the age structure of the species is changed, changes in fishing mortality if there is

9 Ocean pout, windowpane flounder, Atlantic wolffish, and SNE/MA winter flounder are not allocated and retention is prohibited.

a difference between the selectivity used to set ACLs and the selectivity in the fishery, and changes in discards. These possible changes were explored to determine the likely magnitude of the changes and their impacts on potential yields.

Table 71 summarizes the changes in YPR for four stocks that are used as examples: witch flounder, GB haddock, CC/GOM yellowtail flounder, and GOM cod. Using the selectivity as determined by the 2012 groundfish updates or SARC 53 as a starting point, changes at age were examined in quarter-year increments for their impact on YPR. As can be seen from the tables, a shift in selectivity of one year reduces the YPR for these stocks between 9.4 pct (GOM cod) to 4.6 pct (GB haddock). The value of F40 for these stocks declines from 18.5 pct (GOM cod) to 30 pct (GB haddock, witch flounder). Over the long term, these changes would lead to reduced catches at a given stock size and a reduced value for MSY. It is not clear from this analysis if SSB_{MSY} targets would change appreciably.

While this analysis explores changes in YPR that may result if more small fish are caught, it does not address possible changes in recruitment. For many groundfish stocks there is evidence that older, larger fish have higher fecundity, and in some species the survival of larvae from larger fish is greater than from smaller fish. YPR analyses do not address the changes in recruitment that could occur from shifting selectivity to younger ages. The question is whether targeting smaller/younger fish might change the number of older/larger fish in a population. Whether a shift in selectivity to younger ages results in fewer older fish can be explored using age-based projections. Using GOM cod and CC/GOM yellowtail flounder as examples, the age composition of the SSB at equilibrium (in numbers of fish) is compared for two different selectivity patterns in Figure 143 and Figure 144. For each projection, the harvest scenario is at the appropriate F_{MSY} proxy (F40%) for the selectivity pattern. The first projection uses the selectivity pattern from the most recent assessment and the second projection shifts that pattern to younger ages by one year. For these two examples, the number of older fish in the population at equilibrium is slightly higher when selectivity is shifted to younger ages. This is the case as long as the target fishing mortality (in this case, F40%) is adjusted for the change in selectivity.

Figure 143 – Numbers at age at equilibrium for GOM cod at two different fishery selectivities. Ages are all plus groups.

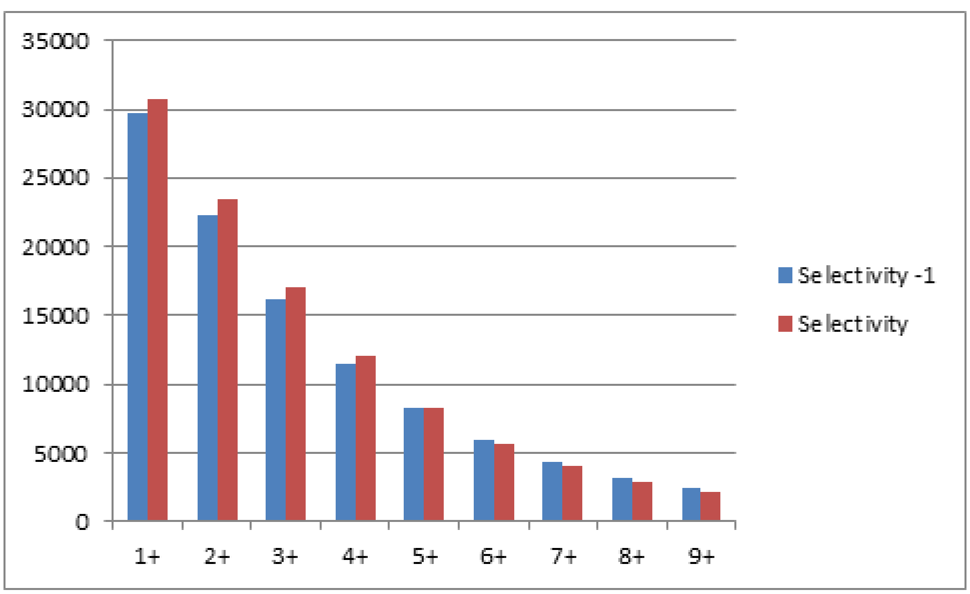
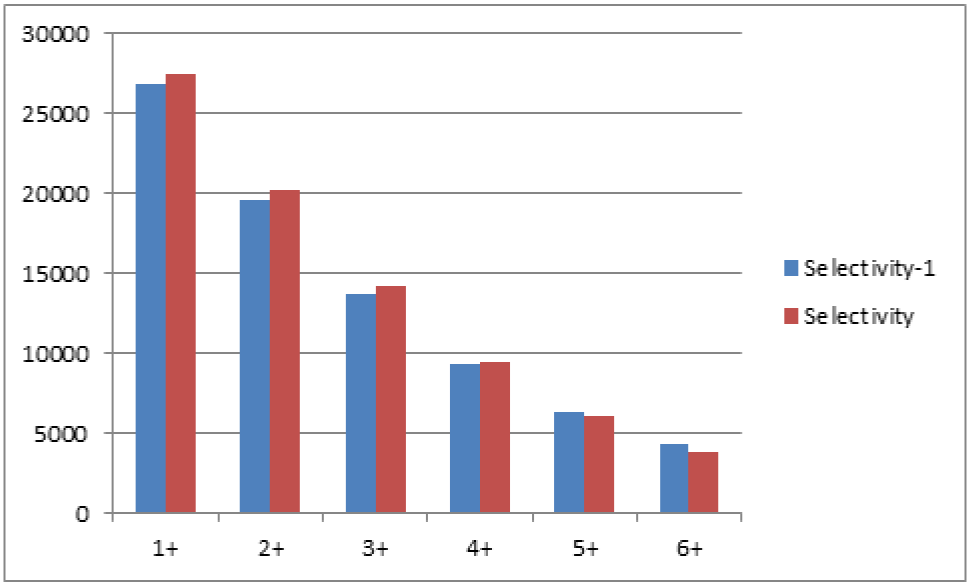


Figure 144 – Numbers at age at equilibrium for CC/GOM yellowtail flounder. Ages are plus groups.



Whether requiring full retention of allocated stocks resulted in a shift in selectivity to younger ages will not be known until a few years after the regulatory change, when an assessment is conducted. In the interim, ABCs/ACLs would normally be set based on the selectivity observed in the last assessment. Another factor to consider is the effect that a change in selectivity would have if catch quotas are based on a different selectivity pattern. The impacts are not necessarily easy to predict and are not obvious, because the selectivity pattern interacts with the age structure of the population, rebuilding requirements, and the changes in the fishing mortality reference point. As examples of what could occur, the implications are explored for two representative stocks: GOM cod and CC/GOM yellowtail flounder. These two stocks were chosen because GOM cod is a relatively long-lived gadoid with an extended age structure (at least potentially), while CC/GOM yellowtail flounder is a rapidly growing flatfish within a contracted age structure. In addition, similar analyses were applied to GB haddock because of indications that an unusually large year class may be entering the fishery.

GOM Cod

For this analysis, a stock projection based on the SARC 53 assessment was performed. An estimated catch for 2011 and 2012 was used as an input, and then the catch at 75 pct of F_{MSY} was used for years 2014 through 2030. The catches, realized fishing mortality (F/F_{MSY}), SSB/SSB_{MSY} ratio, probability of overfishing, and probability of rebuilding are shown in Table 72. This is considered the baseline projection.

A comparison to the baseline projection used a selectivity pattern shifted one year to younger ages. No adjustment was made to the selectivity at ages beyond the age of full recruitment. The same data elements are reported in Table 73. For the comparison to be valid, a new SSB_{MSY} was calculated using the F40 proxy that applies to the revised selectivity pattern. This projection used the same catches as were used in the baseline projection.

Comparing the two projections reveals that if the same catches are used in both projections (as would be the case if the ABCs were set for the entire time period based on the SARC 53 selectivity) and selectivity shifts to younger fish, the ratio of F/FMSY under the new selectivity is higher than in the baseline projection. Rebuilding would be slower (delayed about two years beyond the baseline projection) and the probability of overfishing is higher. The baseline and revised selectivity ratios of SSB/SSB_{MSY} are plotted in Figure 145.

A more realistic scenario is shown in Table 74. This example assumes that the new selectivity is detected and ABCs for 2015 and beyond are set using this new pattern while fishing at 75 percent of F_{MSY}. Catches would be lower and rebuilding occurs about one year later than the baseline projection.

CC/GOM yellowtail flounder

For this analysis, a stock projection based on the SARC 53 assessment was performed. An estimated catch for 2011 and 2012 was used as an input, and then the catch at 75 percent of F_{MSY} is used for years 2014 through 2023. The catches, realized fishing mortality (F/F_{MSY}), SSB/SSB_{MSY} ratio, probability of overfishing, and probability of rebuilding are shown in the Table 75. This is considered the baseline projection.

A comparison to the baseline projection used a selectivity pattern shifted one year to younger ages. No adjustment was made to the selectivity at ages beyond the age of full recruitment. The same data elements are reported in Table 73. For the comparison to be valid, a new SSB_{MSY} was calculated using the F40 proxy that applies to the revised selectivity pattern. This projection used the same catches as were used in the baseline projection.

Comparing the two projections reveals that if the same catches are used in both projections (as would be the case if the ABCs were set for the entire time period based on the assessment update selectivity) and selectivity shifts to younger fish, the ratio of F/F_{MSY} under the new selectivity is higher than in the baseline projection. Rebuilding time would be almost the same and the probability of overfishing is higher.

A more realistic scenario is shown in Table 77. This example assumes that the new selectivity is detected and ABCs for 2015 and beyond are set using this new pattern while fishing at 75 percent of F_{MSY}. Catches would be about ten percent lower in each year of the rebuilding period.

GB Haddock

The 2012 Update Assessment for GB haddock estimated the 2010 year class as very large. This is consistent with estimates of that year class for EGB haddock from the TRAC 2010 and TRAC 2011 assessment reports. Uncertainty over the size of the year class resulted in down-weighting the estimate by 59 percent in the projections used to set catch advice. The most recent exceptionally large year class was the 2003 year class. That cohort was observed to grow more slowly and as a result have a lower fishery selectivity at age than more normal year classes. Nevertheless, it is possible that the presence of a large year class, proposed reductions in the minimum size for haddock, and the possibility of access to parts of closed areas could lead to increased targeting of this year class. Such changes would only occur on the catches by U.S. fishermen. Since the ACLs for FY 2013 – 2015 are based on the selectivity observed in recent years the impact of a shift in selectivity was explored. The projection model was run with selectivity shifted one year to younger ages, with no change in the selectivity at older ages, and assuming that the entire ABC is caught in each year. The results are consistent with other analyses in this section. The shift in selectivity results in a decline in total fishing mortality from 2013 through 2015, with little change in projected SSB (Figure 1 and Figure 2). When compared to Option 1 No Action, this option would result in a decline in fishing mortality. When compared to Option 2, the decline would not be as large. Over the long term, the shift would also be expected to reduce YPR and would lead to a decline in F_{MSY} or its proxy.

For the two examples shown, a change in selectivity to younger ages would result in a reduction in yields over the long term. It does not appear that there would be an increase in fishing mortality in the short term that would be caused by fishing on a quota that was set with a different selectivity.

With respect to discards of regulated groundfish, this measure would be expected to reduce the amount of regulatory discards. As described in Section 6.5.12.1.2, a large proportion of discards are due to the requirement to discard fish below the minimum legal size. By removing this requirement, the expectation is that at most of these fish that are currently sub-legal will not be discarded. They will either be landed or fishermen may take measures to avoid catching these fish so that they do not need to dispose of fish that may be too small for any market. Reducing the magnitude of discards may have indirect biological impacts as it could lead to more accurate catch information.

In summary, there are several possible biological impacts of requiring sectors to retain all allocated regulated groundfish. These impacts depend on whether this measure leads to a shift in selectivity in the fishery and results in catching a greater proportion of small fish. If such a change occurs, then yield per recruit would be expected to decline. This would lead to a reduction in F_{MSY} or its proxy. These changes would result in reduced catches at any specific stock size when compared to Option 1 No Action, and to a lesser extent when comapred to Option 2. MSY values would decline when compared to either Option 1 or Option 2. Biomass targets are likely to increase, but the changes estimated for GOM cod and CC/GOM yellowtail flounder are not large. Since the magnitude of the shift in selectivity will not be known until a subsequent assessment, it is possible that rebuilding progress for overfished stocks may be slowed because catch quotas may be set using a selectivity that is different than that realized in the fishery. Regulatory discards would be expected to be reduced when comapred to either Option 1 No Action or Option 2, which could lead to less uncertainty about catches and may improve assessments. Any improvement in assessments, however, is likely to be minor as discards are currently a small proportion of most catches of allocated stocks; such changes are likely to be obscured by other assessment uncertainties. To the extent that size-selective fishing may result in evolutionary changes that adversely effect groundfish species, this measure would remove a regulatory impediment that prevents targeting smaller fish and would be beneficial when compared to Option 1 No Action or Option 2.

While these changes are possible for all stocks, the information in Section 7.4.3.3.3 can be used to identify the stocks where these changes are most likely to occur. Based on the discussion in that section, a change in selectivity could occur for any stock, but appears more likely to result for yellowtail flounder and winter flounder than for other species. Changes might also result for cod and pollock, but are less likely because of the premium paid for larger fish. Changes might also be observed for GB haddock because of evidence of episodic large year classes that tend to grow slowly (for example, the 2003 year class). Removing minimum size requirments may lead to increased targeting of these large year classes.

One factor that makes it difficult to predict biological impacts of this measure is uncertainty over whether state agencies will modify minimum size limits to match this option. If they do not, then this measure may prove moot as vessels will not be able to land fish smaller than the minimum size mandated by the states.

Impacts on other species

This option is not likely to have any direct biological impacts on other species. The measure would only change minimum size limits for regulated groundfish. It could, however, lead to indirect impacts if fishermen change behavior to target smaller regulated groundfish and this leads to changes in the catch of species that are incidentally caught while doing so. It is not possible to predict the direction or magnitude of those changes, but the species that might be affected include the various skate species, dogfish , and monkfish that are often caught on groundfish trips. It is not clear if these impacts will be different than those of Option 1 No Action; they are likely to be similar, if greater in magnitude, to the impacts that could occur under Option 2.

Table 71 – Impact of changes in selectivity on YPR for four groundfish stocks

GB haddock					
age	status quo	"1/4	"1/2	"3/4	"1 age
1	0.018048	0.03	0.04	0.045	0.059397
2	0.059397	0.09	0.13	0.18	0.222259
3	0.222259	0.25	0.29	0.33	0.384552
4	0.384552	0.44	0.53	0.61	0.707236
5	0.707236	0.84	0.93	0.99	1
6	1	1	1	1	1
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
F40	0.3872	0.3492	0.3153	0.2903	0.2692
ypr	0.49168	0.486	0.48	0.47483	0.46917
ratio	1	0.988448	0.976245	0.96573	0.954218
witch fld					
age	status quo	"1/4	"1/2	"3/4	"1 age
3	0.011	0.02	0.022	0.03	0.039
4	0.039	0.05	0.055	0.069	0.091
5	0.091	0.15	0.22	0.31	0.42
6	0.427	0.59	0.78	0.93	1
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	1	1	1	1	1
11	1	1	1	1	1
F40	0.2718	0.2287	0.213	0.1995	0.1896
ypr	0.20682	0.20118	0.19795	0.19471	0.19194
ratio	1	0.97273	0.957112	0.941447	0.928053

CC gom YT					
age	status quo	"1/4	"1/2	"3/4	"1 age
1	0.001	0.015	0.03	0.062	0.064
2	0.064	0.14	0.26	0.39	0.486
3	0.486	0.64	0.79	0.92	1
4	1	1	1	1	1
5	1	1	1	1	1
6	1	1	1	1	1
F40	0.2594	0.2382	0.2178	0.2007	0.1917
ypr	0.21265	0.20811	0.20342	0.19883	0.19674
ratio to sq	1	0.97865	0.956595	0.935011	0.925182
GOM cod					
age	status quo	"1/4	"1/2	"3/4	"1 age
1	0.02	0.036	0.05	0.072	0.109
2	0.109	0.17	0.22	0.31	0.395
3	0.395	0.5	0.63	0.75	0.844
4	0.844	0.92	0.95	0.98	1
5	1	1	1	1	1
6	1	1	1	1	1
7	0.896	0.896	0.896	0.896	0.896
8	0.88	0.88	0.88	0.88	0.88
9	0.673	0.673	0.673	0.673	0.673
F40	0.1962	0.1852	0.1765	0.1674	0.1599
ypr	1.20128	1.17111	1.14553	1.11565	1.0884
ratio sq	1	0.974885	0.953591	0.928718	0.906034

Table 72 – GOM cod projection using SARC 53 inputs

		FMSY:	0.2	SSBMSY:	61218		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	7750	0.92	4.60	9478	0.15	1.000	0.000
2012	6700	0.879	4.40	8168	0.13	0.995	0.000
2013	1961	0.2	1.00	10235	0.17	0.500	0.000
2014	2463	0.15	0.75	16376	0.27	0.220	0.000
2015	3525	0.1496	0.75	23379	0.38	0.220	0.000
2016	4484	0.1495	0.75	30195	0.49	0.232	0.010
2017	5387	0.1491	0.75	36947	0.60	0.224	0.046
2018	6298	0.1499	0.75	43815	0.72	0.220	0.128
2019	7061	0.1499	0.75	50941	0.83	0.220	0.279
2020	7683	0.1502	0.75	57045	0.93	0.220	0.414
2021	8128	0.1496	0.75	61641	1.01	0.223	***0.508***
2022	8499	0.15	0.75	65248	1.07	0.219	0.567
2023	8762	0.1493	0.75	68080	1.11	0.217	0.616
2024	8938	0.1491	0.75	70324	1.15	0.214	0.651
2025	9105	0.1496	0.75	71952	1.18	0.215	0.674
2026	9193	0.1496	0.75	72896	1.19	0.213	0.686
2027	9281	0.15	0.75	73558	1.20	0.215	0.697
2028	9338	0.1492	0.75	74564	1.22	0.212	0.707
2029	9395	0.1489	0.74	74960	1.22	0.213	0.715
2030	9455	0.1498	0.75	75507	1.23	0.211	0.719
Total	143406						

Table 73 - GOM cod projection using SARC 53 inputs but revised selectivity in 2013 and beyond

		FMSY:	0.1599	SSBMSY:	62900		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	7750	0.92	*4.60*	*9478*	*0.15*	1.00	0.00
2012	6700	0.8787	*4.40*	*8168*	*0.13*	0.99	0.00
2013	1961	0.1293	0.81	10281	0.16	0.27	0.00
2014	2463	0.1082	0.68	16445	0.26	0.14	0.00
2015	3525	0.1175	0.73	23388	0.37	0.20	0.00
2016	4484	0.1236	0.77	30117	0.48	0.24	0.01
2017	5387	0.1266	0.79	36932	0.59	0.26	0.04
2018	6298	0.1309	0.82	43633	0.69	0.28	0.11
2019	7061	0.1342	0.84	50510	0.80	0.30	0.23
2020	7683	0.1369	0.86	55892	0.89	0.32	0.36
2021	8128	0.1385	0.87	59777	0.95	0.34	0.44
2022	8499	0.1408	0.88	62552	0.99	0.35	0.49
2023	8762	0.1425	0.89	64613	1.03	0.37	***<u>0.53</u>***
2024	8938	0.1441	0.90	65906	1.05	0.38	0.55
2025	9105	0.1459	0.91	66657	1.06	0.39	0.56
2026	9193	0.1474	0.92	66906	1.06	0.40	0.57
2027	9281	0.1485	0.93	67073	1.07	0.42	0.57
2028	9338	0.1499	0.94	66753	1.06	0.42	0.57
2029	9395	0.1509	0.94	66657	1.06	0.44	0.56
2030	9455	0.1526	0.95	66589	1.06	0.45	0.56

Figure 145 – GOM cod SSB/SSBMSY under two selectivity scenarios

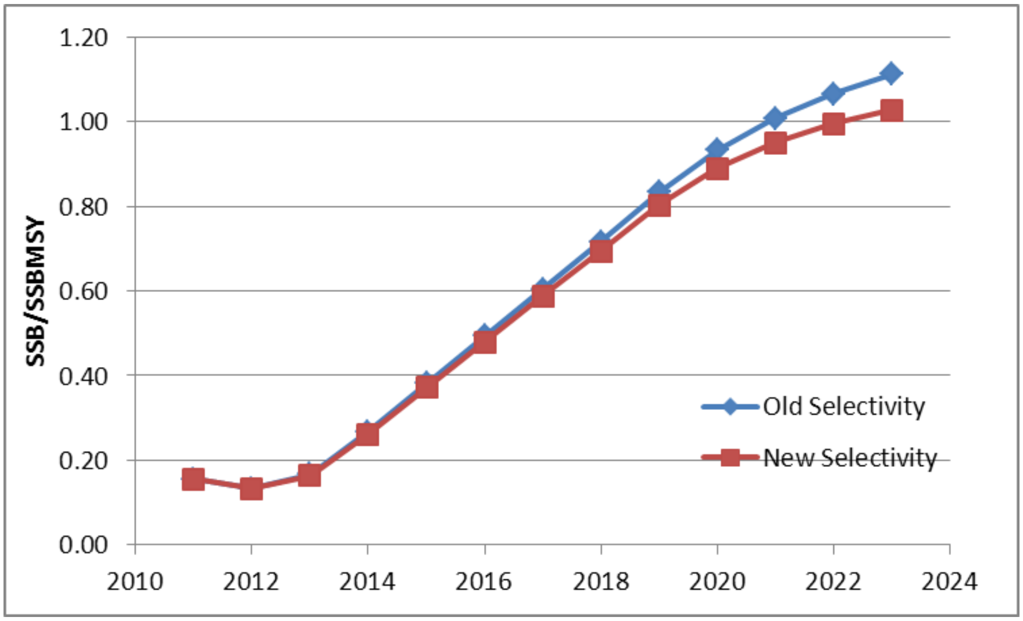


Table 74 – GOM cod projection with revised selectivity and new catches based on 75 pct of FMSY beginning in 2015

75% FMSY after 2015		FMSY:	0.1599	SSBMSY:	62900		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	7750	0.92	*4.60*	*9478*	*0.15*	1.00	0.00
2012	6700	0.8787	*4.40*	*8168*	*0.13*	0.99	0.00
2013	1961	0.1293	0.81	10281	0.16	0.27	0.00
2014	2463	0.1082	0.68	16445	0.26	0.14	0.00
2015	3594	0.1199	0.75	23375	0.37	0.21	0.00
2016	4349	0.1199	0.75	30080	0.48	0.22	0.01
2017	5117	0.1198	0.75	37034	0.59	0.22	0.04
2018	5820	0.1196	0.75	44062	0.70	0.21	0.11
2019	6438	0.1198	0.75	51484	0.82	0.21	0.25
2020	6928	0.1196	0.75	57585	0.92	0.21	0.39
2021	7322	0.1197	0.75	62356	0.99	0.21	0.49
2022	7610	0.1195	0.75	66086	1.05	0.20	***0.56***
2023	7839	0.1196	0.75	69120	1.10	0.20	0.61
2024	8011	0.1198	0.75	71412	1.14	0.20	0.64
2025	8144	0.12	0.75	73113	1.16	0.19	0.66
2026	8220	0.1199	0.75	74154	1.18	0.19	0.68
2027	8297	0.1199	0.75	75135	1.19	0.19	0.70
2028	8355	0.12	0.75	75672	1.20	0.19	0.71
2029	8390	0.1197	0.75	76154	1.21	0.19	0.71
2030	8443	0.1199	0.75	76664	1.22	0.19	0.72

Table 75 – CC/GOM yellowtail flounder projection using SARC 53 inputs

		FMSY:	0.26	SSBMSY:	7.080		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	747	0.3353	1.29	2.8442	0.402	0.95	0
2012	950	0.3718	1.43	2.9221	0.413	0.974	0
2013	549	0.1952	0.75	3.4581	0.488	0.0733	0
2014	719	0.1947	0.75	4.528	0.640	0.0592	0.0244
2015	888	0.1943	0.75	5.4332	0.767	0.0788	0.1134
2016	1048	0.1945	0.75	6.2754	0.886	0.0921	0.2881
2017	1177	0.1944	0.75	6.9591	0.983	0.1103	0.4704
2018	1267	0.1943	0.75	7.4591	1.054	0.1207	0.5901
2019	1331	0.1933	0.74	7.8211	1.105	0.1276	0.6612
2020	1370	0.1925	0.74	8.0686	1.140	0.1264	0.7
2021	1399	0.1924	0.74	8.2303	1.162	0.1322	0.7253
2022	1416	0.1918	0.74	8.3539	1.180	0.1339	0.7422
2023	1430	0.1913	0.74	8.4361	1.192	0.1355	0.7453

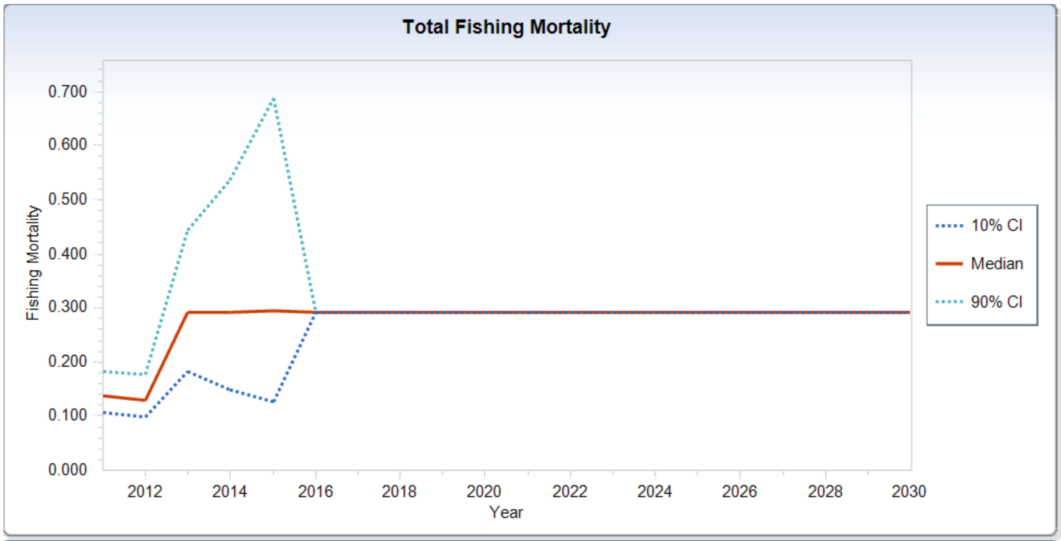
Table 76 – CC/GOM yellowtail flounder projection using SARC 53 inputs but revised selectivity in 2013 and beyond

		FMSY:	0.1917	SSBMSY:	7.120		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	747	0.3353	1.29	2.8442	0.402	0.95	0
2012	950	0.3718	1.43	2.9221	0.413	0.974	0
2013	549	0.1321	0.69	3.4914	0.490	0.0087	0
2014	719	0.1361	0.71	4.5615	0.641	0.0265	0.0235
2015	888	0.145	0.76	5.416	0.761	0.0674	0.1071
2016	1048	0.1518	0.79	6.1989	0.871	0.1212	0.2574
2017	1177	0.1567	0.82	6.8155	0.957	0.1788	0.4245
2018	1267	0.1604	0.84	7.2275	1.015	0.2177	0.5249
2019	1331	0.1645	0.86	7.4763	1.050	0.2462	0.5784
2020	1370	0.1649	0.86	7.6459	1.074	0.2669	0.6057
2021	1399	0.1669	0.87	7.7218	1.085	0.2859	0.6206
2022	1416	0.168	0.88	7.7745	1.092	0.2982	0.6297
2023	1430	0.1685	0.88	7.8132	1.097	0.3126	0.6349

Table 77 – CC/GOM yellowtail flounder projection with revised selectivity and new catches based on 75 pct of FMSY beginning in 2015

75% FMSY after 2015		FMSY:	0.1917	SSBMSY:	7.120		
Year	Catch	F	F/FMSY	SSB	SSB/SSBMSY	Prob Over	Prob.Rebuilt
2011	747	0.3353	1.29	2.8442	0.402	0.95	0
2012	950	0.3718	1.43	2.9221	0.413	0.974	0
2013	549	0.1321	0.69	3.4914	0.490	0.0087	0
2014	719	0.1361	0.71	4.5615	0.641	0.0265	0.0235
2015	850	0.1384	0.72	5.4306	0.763	0.0395	0.1084
2016	964	0.1381	0.72	6.2687	0.880	0.0474	0.2718
2017	1063	0.1383	0.72	6.9812	0.981	0.0595	0.4645
2018	1138	0.139	0.73	7.504	1.054	0.069	0.5909
2019	1190	0.1392	0.73	7.8687	1.105	0.0782	0.6671
2020	1225	0.1388	0.72	8.1544	1.145	0.0807	0.7139
2021	1251	0.1389	0.72	8.332	1.170	0.084	0.7454
2022	1270	0.139	0.73	8.4706	1.190	0.0871	0.7636
2023	1284	0.1386	0.72	8.5896	1.206	0.087	0.7793

Figure 146 – Projected GB haddock fishing mortality: observed fishery selectivity (top) and fishery selectivity shifted one year younger (bottom)



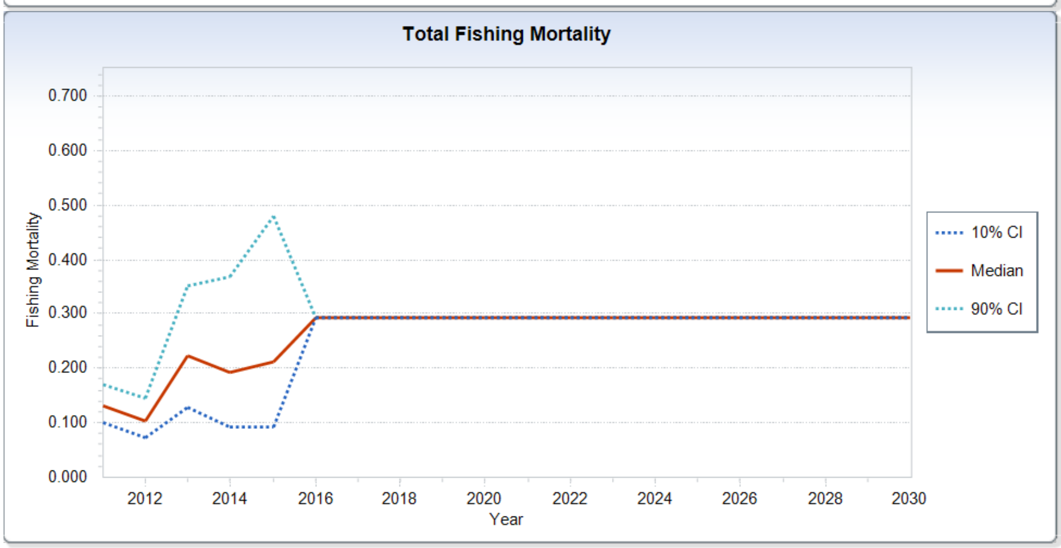
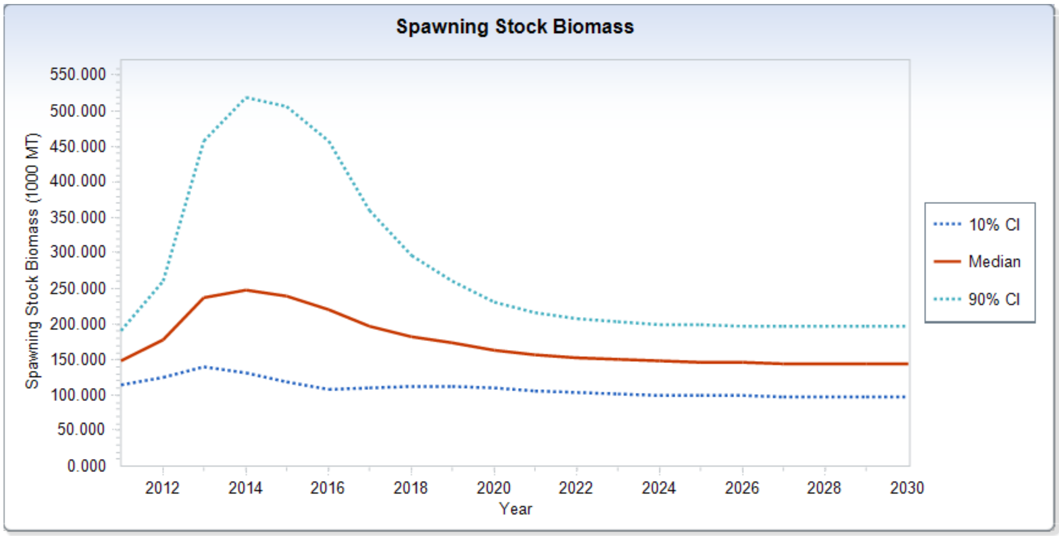
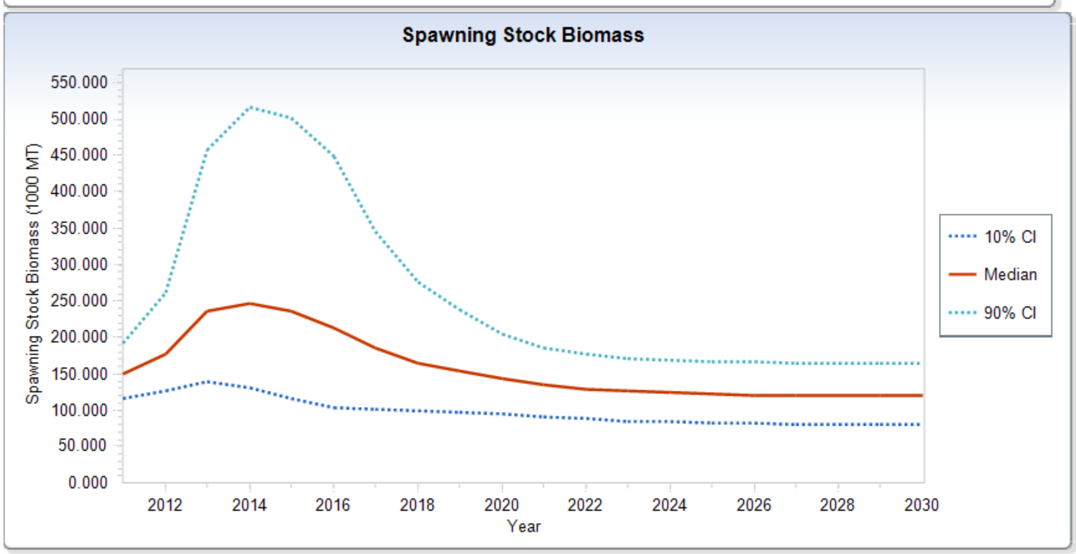


Figure 147 - Projected GB haddock fishing SSB: observed fishery selectivity (top) and fishery selectivity shifted one year younger (bottom)





7.1.2.5 GB Yellowtail Flounder Management Measures

7.1.2.5.1 Option 1: No Action

Impacts on regulated groundfish

This option would not modify the management measures for GB yellowtail flounder. The existing measures have constrained catches to the ACL in recent years, but have not ended overfishing. This is due in part to difficulties in specifying catches that will meet mortality targets and not due to elements of this measure that differ from the alternative options that are being considered.

With respect to specific options that are under consideration, this option would continue to use the entire stock area as the discard stratification scheme used for quota monitoring purposes. This level of area stratification is consistent with that used when assessing this stock, and so presumably it would result in a closer correspondence between in-season discard estimates and the discard estimates used in assessments regardless of how observer coverage is distributed in the area. If there are different discard rates in different areas, however, this approach may lead to increased uncertainty in discard estimates. The analyses summarized in Table 78 and Table 79 show that based on FY 2010 and FY 2011 data, the discard estimates from this option would not be expected to be very different than in Option 2. As discussed, however, the variance may increase.

This option would not impose gear requirements on small-mesh bottom trawl fishing in the GB yellowtail flounder stock area, unlike Option 3. As a result, catches of GB yellowtail flounder by small-mesh trawls would likely be higher under this option than Option 3. As long as these higher catches are taken into account when setting ACLs this should not lead to overfishing. The problem is that it may prove difficult to accurately predict those catches, and if they are under-estimated the probability of overfishing increases. While requiring specific gear under Option 3 may not improve the ability to predict these catches, the No Action option would be expected to result in larger catches and thus any prediction errors would also probably be larger. As a result, Option 1 No Action has a slightly greater chance of resulting in overfishing due to catches by small-mesh bottom trawl vessels. This is only a concern while GB yellowtail flounder ACLs are low and the small-mesh fishery accounts for a substantial percentage of removals as a result. Impacts on other regulated groundfish are not likely to be measureable.

Impacts on other species

There are not likely to be direct impacts on fishing mortality or stock size of other species as a result of the discard strata used if this option is adopted. The selection of discard strata used to monitor GB yellowtail flounder quotas will not modify the discard strata used to estimate discards of other species. There would not likely be differences between this option and Option 2.

For small-mesh bottom trawl fisheries, this option would not impose additional gear requirements designed to reduce GB yellowtail flounder catches. Management of those fisheries woiuld be subject to the relevant FMPs and presumably measures would be adequate to achieve mortality targets. There may be more bycatch of bottom-dwelling species under this option than is the case if Option 3 is adopted.

7.1.2.5.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder *(Preferred Alternative)*

Impacts on regulated groundfish

This measure would modify the way discards are estimated for GB yellowtail flounder. Under Option 1 No Action, each discard stratum applies to the entire GB yellowtail flounder stock area. Discards of GB yellowtail flounder are calculated based on observed and unobserved trips in SAs 522, 525, 561, and 562. This option would divide this area into two separate discard strata: one stratum would be SA 522, and SAs 525/561/562 would be the other stratum.

In a qualitative sense, if there are differences in discard rates between the two strata, and observer coverage is adequate to sample trips from both strata, then stratification should provide more precise estimates of discards. Whether a different point estimate would result from the two stratification schemes depends in part on whether observer coverage with one stratum is distributed in a way that accurately represents fishing activity. If it does not, then stratification into two areas could result in a point estimate that is different from the single stratum approach. Recent assessments of GB yellowtail flounder use only one stratum, so it is possible that if quota monitoring uses a different stratification system the catch estimates for quota monitoring could differ from those used for assessing the stock. If the differences are large, then it will make it more difficult to link quota monitoring catches to mortality targets. If the quota-monitored catch is smaller than the assessment catch mortality targets may be exceeded. If the quota-monitored catch is larger than the assessment catch available yield may be foregone. The differences between the two catch estimates should only apply to discard estimates and not to landings. Large mesh otter trawl discards of GB yellowtail flounder declined dramatically after the implementation of sectors. In 2011, they accounted for less than five percent of the total catch. Assuming these discards remain a small proportion of the total catch, differences in discard estimates between the two stratification approaches are not likely large enough to threaten mortality targets.

Data from fishing years 2010 and 2011 was used to explore how the two proposed discard strata might affect discard estimates used in monitoring sector catches. To simplify the analyses, discards were calculated using the approach used for in-season rates; none of the estimates used the assumed rate or transition rate approach that is used until five trips are observed in a stratum. Since almost all GB yellowtail flounder is caught by trawl gear, only trips using otter trawls (code 050), separator trawls (code 057), or Ruhle trawls (code 054) were used. There are several instances where there were no observed trips in a sector/gear combination and there were unobserved trips, or the opposite; these instances were not included in the analysis. The analyses summarized observed trips and discard rates by sector and gear, and then expanded the discard rates to total discards on unobserved trips by using the total kept catch on unobserved trips. Discards on observed trips were added to get total discards in each gear and sector combination.

The results for FY 2010 are shown in Table 78 and for FY 2011 in Table 79. Generally, for both years the sector/gear discard rate in SA 525/561/562 was higher than the discard rate in SA 522, though there are a few exceptions. The discard rate in SA 525/561/562 was higher than the discard rate for all four areas in all but three instances, and in each of these three instances there were small numbers of trips.

Stratification resulted in relatively small changes in the point estimate of discards. In FY 2010, the total discards estimated for these trips was five percent higher when the Option 2 approach was used, while in FY 2011 the difference was less than one percent. The effect on the variance of the discard estimates was not calculated, but it should be noted that for several sectors stratification into two areas reduces the number of observed trips to low levels which would be expected to increase the variance in those estimates. Lower observer coverage levels and an additional area stratification could result in some sector/gear/area combinations with very high or low discard rates just from chance alone. Estimates based on a finer scale of stratification will be more sensitive to errors in the expansion factor (the unobserved kept–all estimate). Many VTR records attribute all landings to one statistical area even when multiple areas were fished; this could lead to more errors in the kept-all that is used to expand discard rates to an estimate of discards if a discard stratum is small or based on one statistical area.

In summary, based on fishing activity in FY 2010 and FY 2011, changing the stratification of quota-monitoring discard estimates as proposed in this option is not likely to lead to large changes in the point estimate of discards when compared to the stratification method used in Option 1 No Action. As a result this option would be unlikely to result in biological impacts that are any different than those in Option 1 No Action. It is possible that Option 2 may result in increased variance in discard estimates as some sector/gear combinations could have few observed trips in each stratum. Based on FY 2010 and 2011, this appears likely since a number of sector/gear /area combination has fewer than five observed trips. It is also possible that if observer coverage rates decline, the variance of discard estimates could increase because more sector/gear/area combinations will have fewer trips. This option cannot be compared to Option 3 because the two measures address different issues.

Impacts on other species

This option would not have any biological impacts on other species. The proposed change to the discard strata would only be used for catches of GB yellowtail flounder and not for other species. As a result, this measure would not change the way discards of other species are calculated. The biological impacts on other species would not be any different than those expected under Option 1 No Action.

Table 78 – Observed trips and expanded discards using different GB yellowtail flounder stratification schemes, FY 2010. “Other” bold-faced discard rates are higher than those in SA 522; underlined values are higher than the rates for the entire area.

2010		**Observed Trips**						**Expanded Discards**			
		GB Area		522		Other					
Sector ID	Gear	SubTrips	d:K	SubTrips	d:K	SubTrips	d:K	GB	522	Other	(522+Other)
002	050	4	0.084631	2	0.003465	2	***0.098145***	27,498	202	26,077	26,279
005	050	66	0.001679	43	0.001237	23	***0.00212***	5,993	1,877	4,354	6,231
	054	8	0.000605	2	0.000747	6	0.0006	163	39	131	170
	057	68	0.002507	25	0.00243	43	***0.00252***	10,537	1,107	9,441	10,548
007	050	55	0.003898	34	0.001783	21	***0.007747***	9,342	2,477	7,656	10,133
	054	2	0.000974	1	0	1	***0.000988***	9	0	9	9
	057	17	0.004366	7	0.000872	10	***0.006337***	1,298	65	1,397	1,463
009	050	46	0.005128	21	0.002396	25	***0.007148***	14,829	3,283	10,705	13,988
	054	3	0.000128	2	0	1	***0.000129***	1	0	1	1
	057	15	0.021771	7	0.011251	8	***0.031677***	4,469	640	4,786	5,426
012	050	35	0.002082	20	0.001795	15	***0.002374***	3,729	1,155	2,721	3,876
	057	26	0.006762	11	0.001599	15	***0.007824***	6,087	209	6,113	6,322
016	050	51	0.004653	26	0.002122	25	***0.006177***	12,727	1,947	11,190	13,137
	054	25	0.001602	11	0.000452	14	***0.002505***	811	79	893	972
	057	8	0.011684	3	0.000752	5	***0.012846***	1,157	7	1,150	1,157
017	050	95	0.010453	53	0.00295	42	***0.018264***	58,564	7,049	58,322	65,371
	054	1	0.001237			1	***0.001237***	55	0	55	55
	057	16	0.009919	7	0.000195	9	***0.01137***	1,568	4	1,609	1,613
018	050	17	0.008556	7	0.004379	10	***0.009906***	8,004	882	7,270	8,152
019	050	11	0.008052	4	0.000822	7	***0.009357***	4,866	91	4,618	4,708
020	050	3	0.00039	2	0.000391	1	0	98	66	0	66
	057	4	0.017352	1	0.023438	3	0.017299	2,047	12	2,029	2,042
								173,855	21,189	160,530	181,719

Table 79 - Observed trips and expanded discards using different GB yellowtail flounder stratification schemes, FY 2011. “Other” bold-faced discard rates are higher than those in SA 522; underlined values are higher than the rates for the entire area.

		Observed Trips						**Expanded Discards**			
		GB Area		522		Other					
Sector	Gear	Sub Trips	d:K	Sub Trips	d:K	SubTrips	d:K	GB	522	Other	(522+Other)
005	050	100	0.000878	66	0.000918	34	0.000816	3,658	2,018	1,604	3,622
	054	2	0			2	0	0	0	0	0
	057	55	0.002542	20	0.000408	35	***0.003048***	5,827	101	6,311	6,411
007	050	45	0.003	28	0.001599	17	***0.006827***	5,946	2,223	3,978	6,201
	057	6	0.003444	2	0	4	***0.003711***	3,135	0	3,148	3,148
009	050	48	0.007793	26	0.002939	22	***0.012107***	18,034	3,634	12,867	16,501
	057	10	0.001279	5	0.00107	5	***0.001364***	140	29	111	140
012	050	40	0.002714	26	0.000415	14	***0.006013***	3,832	293	4,427	4,720
	057	12	0.00154	6	0	6	***0.001962***	355	0	308	308
								0	0	0	0
016	050	68	0.004404	34	0.000974	34	***0.008926***	12,448	1,423	12,024	13,446
								0	0	0	0
	054	10	0.000401	1	0	9	***0.000409***	81	0	81	81
017	050	160	0.006421	90	0.003126	70	***0.009634***	49,351	12,336	35,642	47,978
	057	10	0.002581	5	0	5	***0.003888***	678	0	712	712
018	050	6	0.005114	3	0.002983	3	***0.006598***	1,628	346	1,367	1,713
019	050	5	0.002488	2	0.001469	3	***0.003045***	1,086	84	1,148	1,232
020	050	5	0.000683	3	0	2	***0.002038***	248	0	138	138
								106,446	22,486	83,865	106,352

7.1.2.5.3 Option 3: Small Mesh Fishery Bottom Trawl Gear Requirements

Impacts on regulated groundfish

Under Option 3, small mesh bottom trawl vessels on non-groundfish trips would be required to use gear to minimize flounder catch in SA 522, 525, 561 or 562. This would reduce the catch of flounder, GB yellowtail flounder in particular, by small mesh bottom trawl vessels. It would reduce the chance of overfishing of GB yellowtail flounder compared to the No Action alternative. The impacts on other regulated groundfish are considered to be minimal.

Impacts on other species

Considering the bottom dwelling nature of GB yellowtail flounder, the bycatch of other bottom dwelling species may be reduced by the gear requirements. Option 3 may result in reduced bycatch of these species when compared to the No Action alternative but it is not expected to have large impacts on other species.

7.1.2.6 Sector Management Provisions – Allowed Exemption Requests

7.1.2.6.1 Introduction

Fishermen on sector vessels are expected to target select groundfish species, monkfish, and skates using gears now in use in the fishery, i.e. standard and haddock separator trawls, sink gillnets, and hook gears (primarily longline). Specific areas within the Cashes Ledge area, the Western Gulf of Maine area, the Nantucket Lightship Area, Closed Area I and Closed Area II are identified under Option 2. Sectors may request exemptions from groundfish closed area regulations to fish (for groundfish and other species) in one or more of these areas using legal fishing gears. The amount of vessels or trips and what gear they are expected to use will be identified in the Sector Operations Plans to be submitted for fishing year 2013.

Overall catches of individual stocks will be monitored and limited by the annual catch limits in the Multispecies FMP, which were set to prevent overfishing or rebuild overfished stocks. Some stocks (e.g. cod and yellowtail flounder) have been fully harvested (i.e. annual catches that are a high proportion of the ACL) and/or have considerably lower ACLs in 2013 through this framework adjustment. In theory, Option 2 allows the fishery to fish for other stocks and avoid those stocks when catches approach the ACLs.

Other stocks which have not been fully harvested (e.g. haddock, pollock, redfish, monkfish, skates) are likely to be targeted in the proposed sector exemption areas. Some vessels may convert or continue to use haddock separator trawls that catch relatively fewer fish of stocks like cod, yellowtail flounder, skates, monkfish, and winter flounder to target haddock on Georges Bank or pollock and redfish in the Gulf of Maine. Other vessels may continue to use standard trawls and sink gillnets to target bottom dwelling stocks such as skates and monkfish. Catches of and revenue derived from other species will also influence what gear fishermen use and the amounts of various species that they catch.

The above considerations and a variety of factors, plus data limitations, prevent the Council from providing quantitative estimates of biological effects for Options 1 and 2 through analytical modeling of fishing behavior. A short-term gain in income is expected from greater access to some stocks, but there may be a long-term loss in stock productivity caused by a reduction in large, old fish that may be present and spawn in the existing groundfish closed areas.

It is difficult to quantify the effects of the proposed sector exemption areas option on total fishing effort or on redistribution of fishing effort, since the NE Multispecies FMP no longer regulates fishing effort of sector enrolled vessels. The amount of fishing effort that results from the multispecies regulations is influenced by changes in commercial CPUE, economics, and regulations that affect alternative fisheries. To some extent, total fishing effort is capped by the ACLs and the catch rates for individual species caught by vessels fishing on multispecies trips.

More importantly, changes in fishing behavior are difficult to quantify because an economic/behavioral model is not available and previous models used before sector management began are now unsuitable. Adding uncertainty is the ability for vessels to switch gears to selectively target groundfish species.

However, two things are clear: with the sector exemption areas open fishing effort will shift from surrounding areas and increases in total fishing effort are possible. Some fishing effort that targeted groundfish around the perimeter of year round closed areas will shift into the proposed sector exemption areas. The analysis in Section 6.6.1 estimates the amount of effort and number of vessels and sectors that fished in the boundaries. It is possible that some fishing effort by larger, more seaworthy vessels in more inshore areas, such as the Gulf of Maine, may shift to offshore proposed sector exemption areas, such as Closed Area II. How much effort shifts from inshore areas will depend on the marginal increase in profit after accounting for changes in CPUE and higher fishing costs for fuel and other supplies. Lower fishing effort where fishing would otherwise occur under No Action could reduce catch and mortality for species that are more abundant in areas previously fished.

Some increase in total fishing effort can also be expected due to changes in CPUE and greater availability of species that have unused ACL, such as haddock, pollock, redfish, monkfish and skates. If sector vessels target haddock particularly with separator gear that total fishing effort could increase by a substantial amount if they are successful in avoiding catches of cod, yellowtail flounder, and other stocks with restrictive ACLs. Most of this potential effort increase would be likely to focus on the Closed Area I and Closed Area II proposed sector exemption areas, based on expected relative CPUEs (particularly for Georges Bank haddock). Catches of haddock can substantially increase if species like cod and yellowtail flounder can be avoided. Sector vessels might achieve this by using separator trawls, but at the expense of reducing the catches of skates, lobster, scallops, monkfish, yellowtail flounder, and other flatfish (Section 6.6.2).

7.1.2.6.2 Qualitative analysis method

Using a thorough analysis of biological characteristics Section 6.6.1 and swept-area estimates of biomass (Section 6.6.2) in the proposed sector exemption areas, plus information derived from published research (Section 6.6.5), the Council made a qualitative assessment of the probable effects on species that are likely to be affected by Option 2. The Council made this assessment using an assembled team of experts, the Closed Area Technical Team, to analyze data and review the relevant literature.

Five functions or factors were considered in this qualitative analysis (Table 81). Some of these addressed recently approved Council goals and objectives for spatial groundfish management, particularly protection of spawning potential and critical life stages (older and more fecund fish).

A "high" impact on age/size structure was assigned when the size frequency distribution of fish was distinctly different and had larger fish in the proposed sector exemption areas than elsewhere. Catch of these large fish could result in reduced age or size structure. In some cases, lower fishing mortality elsewhere could mitigate this loss of large fish, but it would be more likely to occur over the long term and the short term removal of large fish from the proposed sector exemption areas would have negative consequences.

A "high" impact on spawning was assigned when a substantial amount of spawning females were observed in survey data or were known to have a significant amount of spawning in the proposed sector exemption areas. In making this assessment, the Council took into account the seasonal access proposed in Framework 48 for Closed Area I and II to reduce effects on spawning cod and haddock. The Council also recognized the industry agreement adopted by the Atlantic States Marine Fisheries Commission to avoid fishing in portions of Closed Area II when egg-bearing lobsters are frequently present.

A "high" impact on spawning potential was assigned when there appeared to be a substantial amount of spawning females in survey catches within the proposed sector exemption areas, making a substantial fraction of the population of large females vulnerable to fishing. This consideration was given greater weight, i.e. more likely to be classified as "high" or "medium" impact when the stock is at low biomass or overfished. This factor is a combination of the two considerations described above, age/size structure and spawning.

A "high" impact on the preservation of sub-populations was assigned when the literature or other information indicated that different sub-populations exist during part or all of the year and the species exhibited site fidelity, either as a resident population or a population that returned to the same area from year to year.

Although the original purpose and intended effect of the closed areas may not be as relevant under ACL management as it once was under DAS management, the Council considered the potential effect of increasing mortality on the analyzed stocks and the effect on rebuilding. Stocks where a high proportion of the biomass was in the proposed sector exemption areas and were at low biomass (either overfished or may become overfished) were designated as having a "high" impact.

Finally a "low" impact was not equated with "no" impact. In most cases, the qualitative impacts were assigned on a stock-wide basis, considering the additional fishing in the proposed sector exemption areas within the stock area. Where needed, notable differences between proposed sector exemption areas for a stock area were noted in the table below or in the discussion.

Table 80 - Summaries of biological differences between closed and open areas observed in 2002-2012 spring, 2002-2011 fall, and 2002-2007 winter trawl surveys for selected stocks potentially impacted by fishing in the proposed sector exemption areas (Option 2). Details are given in Section 6.6.1.

Stocks with biological differences	Stocks with some differences	Stocks with no observable differences
Haddock	Yellowtail flounder	Winter skate
Winter flounder	Barndoor skate	Pollock
Cod	Cod sub-populations	Redfish
	American lobster	Monkfish
		Thorny skate
		Atlantic wolfish

Table 81. Qualitative assessment of the potential impacts of fishing by sector vessels in the proposed sector exemption areas (Option 2).

	Georges Bank Haddock	Gulf of Maine haddock	Georges Bank cod	Gulf of Maine cod	Georges Bank/SNE winter flounder	Georges Bank yellowtail flounder	Cape cod yellowtail flounder	Pollock
Age/size structure	Med	Low	Med	High	High	Low	Low	Med
Spawning	Low	Low	High	Med	High	High	Low	Med
Spawning potential	Low	Low	High	Med	High	High	Low	Med
Preservation of sub-populaitions	Low	Low	Med	High	High	Unk	Low	Low
Rebuilding potential	Low	Low	High	Med	Med for GB High for SNE	High	Low	Low

	Redfish	Monkfish, N&S	Winter skate	Thorny skate	Barndoor skate	American lobster	Wolffish
Age/size structure	Low	Low	Low	Low	Low	Low	Low
Spawning	Low	Low	Low	Low	Unk	Low*	Unk
Spawning potential	Low	Low	Low	Low	Low	Low	Low
Preservation of sub-populaitions	Low	Low	Low	Low	Low	Low	Low
Rebuilding potential	Med	Low	Low	Low WGOM Med Cashes	Low	Low	Unk

* Ranked as "low" partly in contigent on fishermen adhering to the lobster/groundfish industry agreement.

Option 1 – No Action

No action would keep vessels using gears capable of catching regulated groundfish from fishing in the year round closed areas, with some exceptions for SAPs and experimental fishing. Groundfish and other species that are present in these areas would experience lower fishing mortality than they would experience elsewhere, continuing to grow and reproduce. Many of these fish however appear to migrate into and out of the year round closed areas during the fishing year, some of them being caught by the fishery.

Only three stocks have been identified as having benefited from the year round closed areas: Georges Bank haddock, Georges Bank/Southern New England winter flounder, and subpopulations of cod in the Gulf of Maine (see Section 6.6.2 and 6.6.5). For haddock and winter flounder, the closures have contributed to increases in size-frequency rather than promoting the survival of fish with different (and possibly more productive or robust) biological characteristics. The year round Gulf of Maine closures and possibly the Cod HAPC may have protected certain non-migratory sub-populations of cod that have different biological characteristics than migratory cod. For a population as a whole, this protection may convey benefits through genetic diversity but may not directly improve potential yield10.

Continuing the closures would maintain or expand these differences between fish in the year round closed areas and fish in open fishing areas. These differences can help expand age structure and improve spawning potential of haddock, winter flounder and cod subpopulations, but this linkage to higher productivity has not been quantified for fish in the closure areas. These benefits are possibly offset by the indirect impacts on stocks from keeping the area closed and fishing more intensively in the surrounding open fishing areas.

For the remaining groundfish stocks, there does not appear to be much appreciable direct benefit accruing from continuing the prohibition of fishing in the sector exemption areas.

7.1.2.6.3 Option 2 – Exemption from year-round mortality closures *(Preferred Alternative)*

The Council expects that there would be at least some negative consequences of catch or removal of prey species (fish and shellfish forage for groundfish species) from an area, associated with Option 2. “No” impact or a “positive” impact is associated with continued protection of stocks in the existing closed areas (Option 1). “Positive” impacts are expected for the status quo for species that had demonstrable benefits from the closed areas (haddock and winter flounder; Section 6.6.5) or where there were notable differences inside and outside the closed areas in length frequency distributions (cod, haddock, winter flounder) or biological characteristics (cod; Section 6.6.5); or where stock biomass was low AND a substantial fraction of the stock would become vulnerable to fishing (cod and yellowtail flounder).

In nearly all cases, differences in biological characteristics (e.g. length-weight relationships, length at age, maturity at age, and difference in length frequency at depth) were not found in the spring, fall, and winter survey data (see Section 6.6.1). In some cases but not all, there were differences in the length frequency distributions of female fish. In some cases, the geographical distribution of large or older female fish were used as justification for assessing “Med” or “High” impacts if those larger or older females were

10 Indications are that the unique subpopulations are more robust, but slower growing than migratory subpopulations.

concentrated in the proposed sector exemption areas or would likely migrate out of the current EFH closed areas into the proposed sector exemption areas.

7.1.2.6.3.1 Qualitative analysis of individual stocks

7.1.2.6.3.1.1 Haddock – Georges Bank and Gulf of Maine stocks

The Council determined that impacts on Georges Bank haddock would be "low", except for impacts on age/size structure (Table 81). Georges Bank haddock biomass is near the target and managed with ACLs to prevent overfishing. As summarized in Section 6.6.5 , Kerr et al. (2012) found that Georges Bank haddock were one of the two species (the other being winter flounder) that experienced an increase in biomass directly related to groundfish area closures.

Large and older haddock, particularly in Closed Area I and II, were, however, more abundant inside the proposed sector exemption areas than in currently open fishing areas. Fishing would probably target these large haddock and remove them from the population, reducing age structure. On the other hand, the analysis in Section 6.6.1 suggests that the above average or strong year classes (particularly 2003 and 2005) appear to dissipate from the shallower areas of the bank when they reach ages 7 and 8. This movement had also been observed for the strong 1975 and 1983 year classes, even though Closed Area I and II were closed seasonally. The older fish from stronger 2003 and 2005 year classes may not be present in the proposed sector exemption areas during the 2013 and later fishing years.

In the most recent assessment of Georges Bank cod (http://nefsc.noaa.gov/publications/crd/crd1206/gbhaddock.pdf), the size of the 2010 year class was estimated to be the highest on record, rivaling or exceeding the record 1963 year class. These fish in the observed commercial catches were approximately the same size as the (slower growing) 2003 year class was in 2005 (compare green to blue lines in the figure below). By 2006, the 2003 year class had grown to about 16 inches (40.6 cm), equivalent to the minimum size proposed in this document (Section 4.2.3.2)

Therefore, the exceptionally strong 2010 year class will begin reaching minimum size in the 2013 fishing year. Since the Georges Bank haddock ACL will reflect projected biomass that include the 2010 year class, it will likely increase and vessels fishing in the proposed sector exemption areas may be more able to target these fish. Intensified fishing on this year class could decrease yield-per-recruit, although it is unlikely to have much impact on spawning potential. If vessels can avoid stocks with low ACLs (e.g. cod and yellowtail flounder), the combination of the proposed sector exemption areas and lower size limits could promote an increase in fishing effort.

"Low" impacts are expected to be associated with Gulf of Maine haddock, because haddock are either present in deeper areas of the Gulf of Maine that are currently open to fishing, or are protected in the part of the Western Gulf of Maine area that would remain closed. It should be noted however that unlike Georges Bank, Gulf of Maine haddock are experiencing overfishing according to the latest available status report.

7.1.2.6.3.1.2 Cod– Georges Bank and Gulf of Maine stocks

Although many of the large and spawning cod occur in the Cod HAPC or EFH closed areas, impacts on Georges Bank cod spawning, spawning potential, and rebuilding potential were classified as “High”. The Georges Bank stock is at relatively low biomass, so any removals of large, spawning cod is likely to have a relatively high impact on spawning, spawning potential, and on rebuilding potential. Cod length frequency data indicated a disproportionate abundance of large female cod in the Georges Bank habitat closed areas and in the proposed sector exemption areas.

On the other hand, the highest abundance of large female cod were in the habitat closed areas and not in the proposed sector exemption areas. Relatively few cod were observed during the spring and fall surveys in the Western Gulf of Maine and Cashes Ledge proposed sector exemption areas. However, it should be noted that the trawl survey CPUE was higher than in surrounding areas within the Western Gulf of Maine habitat area. Seasonal movement through the Western Gulf of Maine proposed sector exemption area could make these fish more vulnerable.

The observed cod length frequencies tended to show larger cod in the proposed sector exemption areas, but unlike the habitat closed areas there were relatively few observations of older female cod. Cod may however utilize these areas during other parts of the year and any fishing effort that would target large cod would reduce spawning potential and would be detrimental to stock rebuilding. Based on the distribution of large cod and the stock status, the Council classified the impact on spawning and spawning potential as “Medium”. Gulf of Maine cod are thought to have sub-populations of resident fish that are associated with specific structure. Some of these structures are found in the Western Gulf of Maine and Cashes Ledge areas, although specific areas in the proposed sector exemption areas were not identified. Considering all the factors and uncertainty, the Council classified the impact on sub-populations of Gulf of Maine cod to be “high”.

7.1.2.6.3.1.3 Winter flounder – Georges Bank/Southern New England and Gulf of Maine stocks

Winter flounder were one of the two Georges Bank stocks (the other being haddock) that Kerr et al identified as benefiting from the existing closed areas. And although there were no observable differences in length at age or in maturity at age, the analysis of spring and fall survey data indicated that there were differences in the length-weight relationship and in length frequency of winter flounder in the habitat closed and proposed sector exemption areas, compared with fish caught in areas currently open to fishing. In the spring, winter flounder were often observed in the northern part of the Closed Area II proposed sector exemption area, but this area would not be open to fishing by sector vessels at this time of year. In the fall, high concentrations of developing winter flounder were observed in the northern part of the Closed Area II and throughout the Closed Area I proposed sector exemption areas, plus some developing winter flounder in the Nantucket Lightship Area proposed sector exemption area. Winter flounder are also believed to form spawning sub-populations inshore and may have similar characteristics offshore. Taking all these factors into account, the Council classified the impact on age/size structure, spawning, spawning potential, and preservation of sub-populations as “High”. Due to the status of winter flounder, the Council classified the potential removal of large winter flounder on rebuilding as “Med” to “High”.

In the Gulf of Maine, most of the winter flounder occupy areas to the west and south of the Western Gulf of Maine closed areas, with some fish observed in the SW corner of the habitat closed area. The surveys observed no winter flounder in the Gulf of Maine proposed sector exemption areas. All impacts on Gulf of Maine winter flounder were therefore classified as "Low". To the extent that the proposed sector exemption option will shift effort from inshore to the offshore part of the Western Gulf of Maine area and other areas may reduce effort on spawning winter flounder.

7.1.2.6.3.1.4 Yellowtail flounder – Georges Bank and Cape Cod stocks

Few if any biological differences or differences in size frequency of yellowtail flounder were found inside and outside of the closed areas. A large proportion of the stock of yellowtail flounder (including spawning yellowtail flounder) were, however, observed in the proposed sector exemption areas of the Nantucket Lightship Area, Closed Area I, and Closed Area II. Therefore the impact on size/age structure is classified as being "Low", while the impact on spawning, spawning potential, and rebuilding potential is classified as "High". It is not known whether yellowtail flounder form sub-populations.

The biological impacts on the Cape Cod yellowtail flounder stocks were classified as "Low" because few fish were observed during the spring and fall in the proposed sector exemption areas. To the extent that the proposed sector exemption option will shift effort from inshore to the offshore part of the Western Gulf of Maine area and other areas may reduce effort on spawning yellowtail flounder.

7.1.2.6.3.1.5 Pollock

The impacts of fishing in the proposed sector exemption areas was classified as "Medium" for age/size structure, spawning, and spawning potential. The impacts on sub-populations and rebuilding potential was ranked "Low" due to the mobility of pollock and stock status.

Biological and length frequency differences of pollock inside and outside of the closed areas were unobservable and large female pollock were widely scattered throughout the Gulf of Maine and on the northern edge of Georges Bank in deep water. Large female pollock were caught by the spring and fall surveys in both the habitat areas and the proposed sector exemption areas, but the data suggest a higher concentration of large female pollock on the eastern part of the Western Gulf of Maine (Figure 111), overlapping the proposed sector exemption area.

7.1.2.6.3.1.6 Redfish

The impacts of fishing in the proposed sector exemption areas was classified as "Low" for all biological considerations. Somewhat like pollock above, the survey data indicates a wide distribution of mature redfish in the deeper portions of the Gulf of Maine. There does appear to be some concentration of ripe redfish in the Cashes Ledge proposed sector exemption area during spring, but ripe female redfish are also frequently caught in the surveys from open fishing areas. Length frequencies of female redfish inside and outside of the closed areas is unremarkable and may in fact favor larger redfish in deeper waters currently open to fishing.

7.1.2.6.3.1.7 Monkfish – northern and southern stocks

The impacts of fishing in the proposed sector exemption areas of Georges Bank and the Gulf of Maine were classified as "Low".

Monkfish were observed less frequently in survey catches within the Georges Bank proposed sector exemption areas than elsewhere. Length-frequency and differences in biological characteristics were unremarkable. Nearly all the catches in the fall survey were in deeper water along the shelf edge, areas outside of the proposed sector exemption areas.

In the Gulf of Maine, female monkfish were widely available to the fishery in open fishing areas, with a relatively small proportion of the stock caught in the proposed sector exemption areas. There were some developing females observed in the Western Gulf of Maine proposed sector exemption area, but a substantial stock-wide impact is unlikely. In the Gulf of Maine, the monkfish in the closed areas were not larger than in open fishing areas elsewhere.

7.1.2.6.3.1.8 Winter skate

Although the surveys catch winter skate relatively frequently in the Georges Bank sector exemption areas, winter skate are widely available to the fishery elsewhere. There do not appear to be differences in length-frequency distributions inside and outside of the closed areas. Any targeting of winter skate in the proposed sector exemption areas is unlikely to have a disproportionate impact on the stock, spawning, or spawning potential. Few winter skate were caught in the Gulf of Maine proposed sector exemption areas. Therefore the Council ranked the impact of fishing in the proposed sector exemption areas on winter skate as being “Low” for all biological considerations.

7.1.2.6.3.1.9 Thorny skate

The survey caught few thorny skate in the Georges Bank proposed sector exemption areas. The survey caught relatively high amounts of small thorny skate on Cashes Ledge, similar to the catches west of the Western Gulf of Maine in open fishing areas. Larger thorny skate were caught in the habitat closed area within the Western Gulf of Maine area, but not in the proposed sector exemption area. Although the additional fishing area in Option 2 may cause vessels to shift fishing effort from inshore areas now open to fishing, the larger thorny skate in the habitat closed areas may seasonally migrate out into the proposed sector exemption area.

The impacts of fishing in the proposed sector exemption area on age/size structure, spawning, spawning potential, and protection of sub-populations was classified as “Low”. Due to the higher concentration of small thorny skate in the Cashes Ledge proposed sector exemption area, the Council classified the impact of fishing in this area on thorny skate rebuilding potential as “Medium”.

7.1.2.6.3.1.10 Barndoor skate

Like monkfish, surveys caught barndoor skate in deeper water along the shelf edge of Georges Bank and Southern New England during the spring, but scattered in shallower water of Georges Bank (throughout open fishing areas and the proposed sector exemption areas) in the fall. In the spring, the closed areas had smaller barndoor skate than in the open fishing areas. Based on the locations of the proposed sector exemption areas and the distribution of barndoor skate in the surveys, the Council classified the impacts of Option 2 on barndoor skate as “Low” for all biological considerations.

7.1.2.6.3.1.11 American lobster

During the spring, relatively few lobsters were observed in survey catches in either Georges Bank or the Gulf of Maine. In the fall, there were high concentrations of egg-bearing females in the northern half of the Closed Area II proposed sector exemption area. An industry agreement, supported by the ASMFC Lobster Board is expected to minimize impacts on lobster spawning. As long as this agreement stands, the expected impact of fishing in the proposed sector exemption areas on lobster is expected to be "Low".

7.1.2.6.3.1.12 Atlantic wolfish

Since 2002, the surveys have caught relatively few wolfish in the proposed sector exemption areas. Most of the wolfish and large females were caught by the surveys in the Western Gulf of Maine habitat closed areas or to the west of the Western Gulf of Maine closed area, currently open to fishing. Some of the fishing effort that occurs here (and may catch wolfish) could shift further offshore under Option 2. Based on the distribution of wolfish and the relatively low catches of wolfish in the proposed sector exemption areas, the Council classified as "Low" the expected impacts of fishing in the proposed sector exemption areas.

7.1.2.7 Commercial Fishery Accountability Measures

7.1.2.7.1 Option 1: No Action

Impacts on regulated groundfish

This option would not change existing AMs for the groundfish fishery. Most groundfish stocks would remain subject to a quota, either through the sector allocations or the trimester TAC AM used for common pool vessels. The biological impacts of this option are comapred to the specific alternatives that are under consideration.

If this option is adopted, AMs for stocks not allocated to sectors are not implemented until the second year after a sub-ACL is exceeded (year 3 for an overage in year 1). This delay allows for a careful review of catch information before AMs are implemented. This was adopted because for many of these stocks a substantial portion of the catch is taken outside the groundfish fishery and catch data is not timely. While this makes it less likely that an AM will be triggered due to faulty or incomplete catch data, it also means that if there is an overage in year 1 there are no measures implemented in year 2 to address the cause of the overage. This makes it more likely that the ACL will be exceeded a second year, which in turn makes it more likely that overfishing may occur. When compared to Option 2, Option 1/No Action is less likely to end overfishing and rebuild fishing stocks because the AM is less effective. This is more of an issue for the windowpane flounder stocks than others, because the ACLs have been exceeded in recent years.

The AM for Atlantic wolffish and SNE/MA winter flounder would remain a proactive prohibition on possession. While this requirement has resulted in catches that are well below the ACLs for these stocks, there isn't an additional measure that would be implemented if the ACL is exceeded. As a result, should that occur, this option is less likely to end overfishing than Option 3. Similarly, this option would continue the requirement that Atlantic halibut possession would be prohibited if the ACL is exceeded. This does not prevent catches, however, and so when compared to Option 3 it would be less likely to end overfishing.

As specified by this option, AMs for the recreational fishery would continue to be adopted only after a sub-ACL for GOM cod or GOM haddock was exceeded. This prevents the pro-active modification of AMs if there is evidence that catches will exceed or be less than the sub-ACL. In the former case, the inability to adjust measures makes it more likely the sub-ACL could be exceeded and overfishing could result (unlike Option 4). In the latter case, fishing mortality might be lower than under Option 4 because catches may be lower than targeted.

HA and HB vessels would continue to be subject to the trimester TAC AM without any changes if this option is adopted. In particular, an overage of a white hake quota would affect HA and HB vessels. This would not be expected to result in any measureable differences in fishing mortality when compared to Option 5. These vessels catch such small amounts of white hake that applying the AM to these vessels would not affect mortality of that species. This option could result in reduced fishing mortality on cod and haddock, two species targeted by handgear fishermen, as the opportunity to fish for these species might be limited by the AM for white hake. Because catches by this gear are small, it is doubtful that different effects on these species between this option and Option 4 would be measureable.

Impacts on other species

This option would not be expected to have any direct biological impacts on other species.

7.1.2.7.2 Option 2: Change to AM timing for Stocks That Are Not Allocated to Sectors *(Preferred Alternative)*

Impacts on regulated groundfish

This option would modify the AM timing for those stocks that are not allocated to sectors (currently the two windowpane flounder stocks, ocean pout, Atlantic wolffish, Atlantic halibut, and SNE/MA winter flounder, though this list could be revised in the future). Under Option 1 No Action, an overage of the ACL that occurs in year one leads to an AM in year three. This measure would modify that requirement so that if reliable information is available the AM can be implemented in year two.

When compared to Option 1 No Action, this measure would be expected to reduce the likelihood that catches of any of these stocks would exceed the ACL for more than one year. This would reduce the likelihood of overfishing and would be expected to expedite the rebuilding of these stocks. Whether these differences from Option 1 No Action actually occur depends on whether the data are available to implement the AM.

Impacts on other species

This option would not be expected to have any direct biological impacts on other species. It is possible that fishing mortality of other species could be affected as a result of the AMs being implemented, but it is not possible to predict these effects. When compared to Option 1 No Action, the only difference is that if Option 2 would be adopted then any effects might occur one year sooner.

7.1.2.7.3 Option 3: Area based Accountability Measures for Altantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder *(Preferred Alternative)*

Impacts on regulated groundfish

This AM would impose area-based restrictions if the total ACL for any of these stocks is exceeded. The restrictions are designed to apply at certain times and in certain areas. If an AM is triggered either selective gear is required in an area or the area is closed to fishing with particular gear. Details are provided in section 4.2.6.3. It is important to note that this AM affects all groundfish fishing activity, sector and common pool, unlike the No Action alternative.

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

Once the catch data were binned by ten-minute squares, a geostatistical test was applied to identify areas with statistically significant higher catches than the immediate area and the stock area as a whole. These areas were used to select the AM areas where appropriate restrictions would be adopted. The size of the areas was selected based on the amount of catches that need to be affected. In addition, qualitative consideration was given to the data limitation previously described, the probability that effort may be displaced into other areas, and the likelihood that the measures may not be perfectly effective (see section FW 47 for a discussion of compliance with Amendment 16 restricted gear areas, which suggests that area-based gear restrictions are not always complied with).

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

As compared to Option 1 No Action, this measure would be expected to lead to more control on groundfish fishery catches of Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder because fishing effort is constrained. Even if the selective gear is not perfectly effective the fact that both common pool and sector vessels are constrained by the AM makes it more likely that the measure will be sufficient to control catches to the ACLs. Because of the increased controls on catches it is more probable that this option will help to achieve mortality targets.

Impacts on other species

Option 3, if adopted, and if the AMs are triggered, may result in reduced fishing mortality for non-groundfish species that are caught on groundfish fishing trips. This is because the AMs either require use of selective trawl gear or close areas to sink gillnet and longline gear. The selective trawl gear would be expected to reduce catches of skates and monkfish in the AM areas. Similarly, closing areas to sink gillnet or longline gear would likely reduce catches of skates and dogfish. Mortality of these stocks under this measure would be expected to be lower than under any of the other options, including Option 1 No Action. These differences would only occur of the AMs are triggered because an ACL is exceeded.

7.1.2.7.4 Option 4: Modifications to the Accountability Measures for SNE/MAB Windowpane Flounder *(Preferred Alternative)*

Impacts on regulated groundfish

This measure would extend the application of the AM for SNE/MAB windowpane flounder to two portions of the ACL. It would apply to both groundfish fishing vessels (as is the case of the Option 1 No Action) and to all trawl vessels using cod ends with mesh of five inches or larger. As shown in Table 42, vessels on groundfish fishing trips catch a relatively small portion of the SNE/MAB windowpane flounder ACL. Vessels using large mesh trawls in other fisheries catch about xxx percent. By extending the AM to those vessels, the AM would be more effective at controlling catches of SNE/MA windowpane flounder. This would reduce the likelihood that catches would exceed the ACL and would reduce the probability that if the ACL is exceeded in one year, overfishing would continue in following years. It also makes it more probable that the imapcts of the AM would be as predicted, since the AM was designed without consideration of the type of trips that occur in the proposed AM areas. When compared to Option 1 No Action, this measure would be more likely to achieve mortality targets for SNE/MAB windowpane flounder.

Impacts on other species

While this measure would not be expected to have direct impacts on other species since it is designed to reduce fishing mortality of SNE/MAB windowpane flounder, it could have indirect effects if the AM is implemented due to an ACL overage. When the AM is in effect, trawl vessels would be required to use selective gear designed to reduce catches of flounders. This could affect catches in the fluke fishery. Impacts are likely to be small since that is a quota-managed fishery and vessels can continue to target fluke outside the AM areas. When comapred to Option 1 No Action, fishing mortality for species such as fluke could be marginally reduced if the AM is triggered but these effects are unlikely.

7.1.2.7.5 Option 5: Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

Impacts on regulated groundfish

This measure would remove white hake from the list of stocks that can lead to a trimester TAC AM for vessels fishing in the common pool under HA or HB permits. Vessels using these permit catch less than one percent of the white hake caught by common pool vessels. Subjecting these vessels to the trimester TAC provisions means that these vessels cannot target other species should the white hake AM get triggered. Preventing these vessels from fishing does not provide any detectable benefits to white hake because catches are so low. This measure is not expected to have any biological impacts on white hake when compared to the Option 1 No Action alternative. This measure could allow handgear permit holders to continue fishing after a trimester TAC was triggered , which would lead to a small increase in catches of other regulated species when compared to Option 1 No Action. But since catches by these vessels are a small part of total catches the impact on fishing mortality is likely to be negligible.

Impacts on other species

This measure would not be expected to have any measureable impacts on non-groundfish sprecies, since these are rarely caught by handgear vessels. There would not be any difference between this measure and Option 1 No Action.

7.1.2.8 Trawl Gear Stowage Requirements

7.1.2.8.1 Option 1: No Action

Impacts on regulated groundfish and other species

This option requires that trawl gear be stowed in specific ways when vessels transit closed areas. This is an administrative measure and was adopted primarily to improve the ability to enforce groundfish closed areas. This measure would not be expected to have any direct biological effects on any species. To the extent the measure reduces the likelihood that a vessel will fish in a closed area, and thus makes closed areas more effective, it could lead to improvements in stock status. When compared to Option 2, however, any differences are likely to be slight since there are other measures in place (VMS, quota-limited catch) that may be even more effective at deterring fishing in closed areas.

7.1.2.8.2 Option 2: Removal of Trawl Gear Stowage Requirements *(Preferred Alternative)*

Impacts on regulated groundfish and other species

This option no longer requires that trawl gear be stowed in specific ways when vessels transit closed areas. This is an administrative measure and would not be expected to have any direct biological effects on any species. To the extent the measure increases the likelihood that a vessel will fish in a closed area, and thus makes closed areas less effective, it could lead to improvements in stock status. When compared to Option 1, however, any differences are likely to be slight since there are other measures in place (VMS, quota-limited catch) that may be even more effective at deterring fishing in closed areas.

7.2 Essential Fish Habitat Impacts

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

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

7.2.1.1 Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake

7.2.1.1.1 Option 1: No Action

Adoption of the No Action alternative would mean the status determination criteria (SDC) for GB and GOM cod, SNE/MA yellowtail flounder, and white hake would be the criteria adopted in Amendment 16.

7.2.1.1.2 Option 2: Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake *(Preferred Alternative)*

Adoption of Option 2 would mean the status determination criteria (SDC) for the two cod and the SNE/MA yellowtail flounder stocks would be updated based on the results of the 2012 assessments. The white hake assessment will be updated during 2013.

From a habitat perspective, the SDC themselves are less important than the catch limits that result from implementing those criteria to generate annual catch limits (ACL). Qualitatively, it is assumed that revised criteria based on the most recent scientific advice will result in increases in stock size over the long term, which hopefully should lead to increased catch per unit effort (CPUE), and therefore reduce seabed area swept. However, many factors interact to produce the 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.

7.2.1.2 SNE/MA Windowpane Flounder Sub-ACLs

7.2.1.2.1 Option 1: No Action

If this option is adopted, only the multispecies fishery would have a sub-ACL for this stock and the AMs for the multispecies fishery must be sufficient to account for overages of the overall ACL.

7.2.1.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL *(Preferred Alternative)*

If this option is adopted, a sub-ACL of SNE/MA windowpane flounder would be allocated to the scallop fishery. The sub-ACL will be based on the 90th percentile of the scallop fishery catches (as a percent of the total) for the period from calendar year 2001 through 2010. Combining Limited Access and assumed Limited Access General Category catches, this results in a sub-ACL of 36%. The primary expected benefits of this action are biological; specifically, the risk of exceeding the ACL for this stock will be reduced. If the AM, which will be developed in the scallop FMP, is triggered, effort in that fishery could be reduced, thereby reducing area swept and seabed impacts, or it could be redistributed, shifting the location of area swept and seabed impacts. Because the AMs have not yet been developed, changes are difficult to predict.

7.2.1.2.3 Option 3: Other Sub-Components Sub-ACL *(Preferred Alternative)*

The portion of this stock allocated to other sub-components in federal waters would be treated as a sub-ACL and will be renamed “other fisheries sub-ACL.” Similar to the scallop fishery sub-ACL, the benefits of this measure are primarily related to a reduced risk of overfishing the SNE/MA windowpane stock. However, if the yet -to-be-developed AMs are triggered, and fishing effort is reduced, then area swept and thus seabed impacts could be reduced or redistributed. Because the AMs have not yet been developed, changes are difficult to predict.

7.2.1.3 Scallop Fishery Sub-ACL for GB Yellowtail Flounder

7.2.1.3.1 Option 1: No Action

If this option is adopted, there would not be any changes to how the scallop fishery sub-ACL for GB yellowtail flounder is determined.

7.2.1.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Based on Estimated Catch

If this option is adopted, on an annual basis, the Scallop and Groundfish Plan Development Teams would estimate the amount of GB yellowtail flounder that the scallop fishery is expected to catch in the following year while harvesting the available scallop yield. The sub-ABC of GB yellowtail flounder would be 90 percent of this estimate, and the sub-ACL would be specified by adjusting this sub-ABC for management uncertainty. The relatively low total ABC for this stock in 2013 could lead to a curtailment of effort in the groundfish fishery, in the scallop fishery, or in both fisheries. In terms of impacts to habitat, if we assume that the entire ACL, or close to it will be caught, the allocation method would determine whether more is caught by the scallop fishery or by the groundfish fishery. Although scallop gear has a much smaller linear effective width as compared to otter trawl gear, it is not clear how much yellowtail flounder can be captured per unit seabed impact in each of the fisheries. Thus, it is not known whether shifting yellowtail catch to the scallop industry would lead to less seabed impact, or more seabed impact.

7.2.1.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History *(Preferred Alternative)*

If this option is adopted, the scallop fishery sub-ACL for GB yellowtail flounder would be specified as a fixed percentage of the U.S. ABC, adjusted for management uncertainty to get the scallop fishery sub-ACL. This option would base the scallop fishery sub-ABC for FY 2013 as 40 percent of the U.S. ABC; subsequent years would base the scallop fishery sub-ABC as 16 percent of the U.S. ABC. As noted above, the question is whether this allocation method results in shifts of GB yellowtail flounder catch from one fishery to the other, and if so, whether such shifts result in an increase or a decrease in seabed impact. Again, it is not known whether shifting yellowtail flounder catch to the scallop industry would lead to less seabed impact, or more seabed impact.

7.2.1.4 Small Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

7.2.1.4.1 Option 1: No Action

If this option is adopted, there would not be a specific sub-ACL for GB yellowtail flounder for small-mesh bottom trawl fisheries. Catches of this stock by vessels using this gear would be counted as part of the “other sub-components” category.

7.2.1.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder *(Preferred Alternative)*

If this option is adopted, there would be a specific sub-ACL for GB yellowtail flounder for small-mesh bottom trawl fisheries. AMs would be developed by the relevant FMPs within one year of the implementation of this sub-ACL. Small-mesh bottom trawl fisheries are defined as those vessels that use a bottom otter trawl with a cod-end mesh size of less than 5 inches; typically to catch whiting and squid. The sub-ACL would be based on a percentage of the U.S. ABC for this stock, adjusted for management uncertainty. The percentage would be based on recent catch history, specifically the period 2004-2011. As compared to no action, these AMs will likely have biological benefits to the yellowtail flounder stock by reducing the risk of overfishing, but because the AMs have not yet been specified, it is difficult to know whether seabed impacts would be reduced overall due to reductions in effort if an AM is triggered, or if effort would simply be redistributed into other areas, leading to little change in habitat impacts.

7.2.2 Commercial and Recreational Fishery Measures

7.2.2.1 Management Measures for the Recreational Fishery

7.2.2.1.1 Option 1: No Action

This option would continue the current reactive AM structure.

7.2.2.1.2 Option 2: Revised Accountability Measure for the Recreational Fishery *(Preferred Alternative)*

This option would allow the Regional Administrator to adjust recreational fishery measures to avoid exceeding the sub-ACL. While this measure is expected to have biological benefits in that the risk of exceeding catch limits would be reduced, it is not expected to affect the magnitude of impacts to EFH, because recreational hook and line gear has very minimal impacts on the seabed.

7.2.2.2 Groundfish Monitoring Program Revisions

7.2.2.2.1 Option 1: No Action

This option would not change the monitoring program from the one developed in Amendment 16.

7.2.2.2.2 Option 2: Monitoring Program Goals and Objectives *(Preferred Alternative)*

This option would adopt goals and objectives related to monitoring, specifically to (1) improve documentation of catch, (2) reduce costs, (3) incentivize discard reductions, (4) provide additional data streams for assessments, (5) enhance safety, and (6) periodically review the program for effectiveness. Adoption of these goals and objectives is not expected to have any direct influence on the magnitude of impacts to EFH.

7.2.2.2.3 Option 3: ASM Coverage Levels *(Preferred Alternative)*

Sub-option A would clarify whether the CV standard applies at the stock level or at the stock and sector levels. The biological impacts analyses discuss that the highest level of ASM coverage is likely to occur under no action, with lower coverage rates under the stock-sector level CV standard and the lowest rates under the stock level standard. If being covered by an at-sea monitor has no effect on fishing location or amount of effort and discarding behavior, there would be no influence of the ASM coverage level on fishing activities and therefore on the magnitude of adverse effects to EFH as compared to no action. If being monitored does have an influence on vessel behavior, there could be shifts in the location or amount of fishing that occur under varying levels of ASM coverage. It seems likely that any behavioral changes would have a limited influence on the magnitude of adverse effects, but the directionality and extent of such a change would be nearly impossible to quantify.

Sub-option B would remove the FY 2013 requirement that industry fund at-sea monitors, such that the level of ASM would be whatever NMFS is able to fund. Combined with changes in the CV standard, this option could reduce coverage rates, which might influence fishing behavior if there is observer bias. The effect that this bias could have on adverse effects to EFH is very difficult to estimate but likely to be minimal.

Sub-option C would reduce coverage rates for sector vessels targeting monkfish in the SNE broad stock area using extra large mesh gillnet gear. Because gillnet gear has minimal adverse effects on seabed habitats, reduced coverage rates in this fishery that lead to a change in fishing location or amount of effort are unlikely to have a substantial influence on the magnitude of impacts to EFH for this element of the fishery.

7.2.2.2.4 Option 4: Industry At-Sea Monitoring Cost Responsibility *(Preferred Alternative)*

This option clarifies whether the industry or NMFS would bear specific costs related to at-sea monitoring. Briefly, industry will only be required to cover costs associated with the presence of the monitor on the vessel, and NMFS will be responsible for data management, training, benefits, insurance, etc. This clarification is an administrative measure that is not expected to have any direct influence on the magnitude of impacts to EFH.

7.2.2.3 Dockside monitoring requirements

7.2.2.3.1 Option 1: No Action

The No Action option would resume dockside monitoring for at least 20% of all groundfish trips (sector and common pool combined). While this could have indirect, positive biological impacts due to more accurate landings data improving assessments and allocation decisions, this option is not likely to influence the magnitude of EFH impacts.

7.2.2.3.2 Option 2: Elimination of Dockside Monitoring Requirement *(Preferred Alternative)*

Option 2 would eliminate dockside monitoring. While this could have indirect, negative biological impacts due to less accurate landings data to feed into stock assessments, this option is not likely to influence the magnitude of EFH impacts.

7.2.2.4 Commercial Fishery Minimum Size Restrictions

7.2.2.4.1 Option 1: No Action

The no action option would retain current minimum size limits. As discussed in the biological impacts section, this is likely to result in relatively similar patterns of catches and discards as compared to what is currently being observed. Therefore, fishing locations and seabed contact time required to catch legal size fish is likely to remain similar to current levels, resulting in a similar magnitude of EFH impacts.

7.2.2.4.2 Option 2: Changes to Minimum Size Limits *(Preferred Alternative)*

Under this option, the minimum size limits for cod, haddock, witch flounder, yellowtail flounder, plaice, winter flounder, and redfish would be reduced to be generally consistent with the length where 50 percent of the fish are expected to be mature. Pollock and halibut size limits would remain unchanged. To the extent that this action would reduce discarding and allow vessels to convert more of their catch into landings, this option could reduce fishing time and thereby reduce seabed impacts in the short term, while maintaining similar catch levels (although with a different catch composition by size). However, if there are longer term negative impacts to these stocks associated with reducing minimum sizes, this could lead to reduced catch per unit effort in the future, increasing habitat impacts. The fact that this option does not remove size limits entirely mitigates the longer term concerns to some extent.

7.2.2.4.3 Option 3: Full Retention

Under this option, the minimum size limits for cod, haddock, witch flounder, yellowtail flounder, plaice, winter flounder, redfish, pollock and halibut would be removed, and full retention of all allocated groundfish species would be required. Full retention would not apply to species with no sector sub-ACL that cannot be landed, i.e. SNE/MA winter flounder, N. and S. windowpane, ocean pout, halibut, and wolffish. Species managed under other FMPs (skates, monkfish) could still be discarded.

To the extent that this action would reduce discarding and allow vessels to convert more of their catch into landings, this option could reduce fishing time and thereby reduce seabed impacts in the short term, while maintaining similar catch levels (although with a different catch composition by size). However, if fishing behaviors are modified to target small fish, the risks that this measure will negatively impact the stock are greater than the risks associated with Option 2, because size limits will be removed entirely, not just reduced. Longer term negative impacts to these stocks could lead to reduced catch per unit effort in the future, thereby increasing habitat impacts.

7.2.2.5 GB Yellowtail Flounder Management Measures

7.2.2.5.1 Option 1: No Action

This option would not change management measures for GB yellowtail, specifically there would be no stratification of discard estimates by any elements besides sector, gear, and mesh, and also no gear modification requirements imposed on small-mesh trawling activities (this mainly applies to the squid and whiting fisheries).

7.2.2.5.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder *(Preferred Alternative)*

This option would impose additional stratification criteria for the purpose of estimating in-season progress towards catching the GB yellowtail flounder quota. Specifically, Statistical Area 522 catches would be separated out from catches from other Statistical Areas (561,562, 525). Because catch rates of GB yellowtail flounder in the deeper portions of Statistical Area 522 tend to be lower than in the other statistical areas, this stratification would likely allow trawl vessels targeting other species, particularly haddock, to fish more in this area without exceeding GB yellowtail flounder allocations. Assuming that fishing effort on Georges Bank would be limited by yellowtail flounder catch limits, this stratification could lead to additional fishing activity in Area 522 and elsewhere. This increased effort could increase seabed impacts, but catches would also be expected to more closely approach targets for stocks such as GB haddock.

7.2.2.5.3 Option 3: Small-Mesh Fishery Bottom Trawl Gear Requirements

This option would require the use of trawl gear designed to minimize flounder catches (e.g. raised footrope trawl, separator trawl, Ruhle trawl, rope trawl) for bottom trawl vessels fishing on non-groundfish trips. To the extent that these gears have reduced seabed contact, requiring them would reduce the effects of these non-groundfish fishing activities on EFH.

7.2.2.6 Sector Management Provisions – Allowed Exemption Requests

7.2.2.6.1 Option 1: No Action

Under the No Action option, the proposed exemption areas would remain largely closed to various types of groundfish effort, with the exception of Special Access Programs, and therefore no increase in adverse effects to Essential Fish Habitat would occur within the areas.

7.2.2.6.2 Option 2: Exemption from Year-Round Mortality Closures

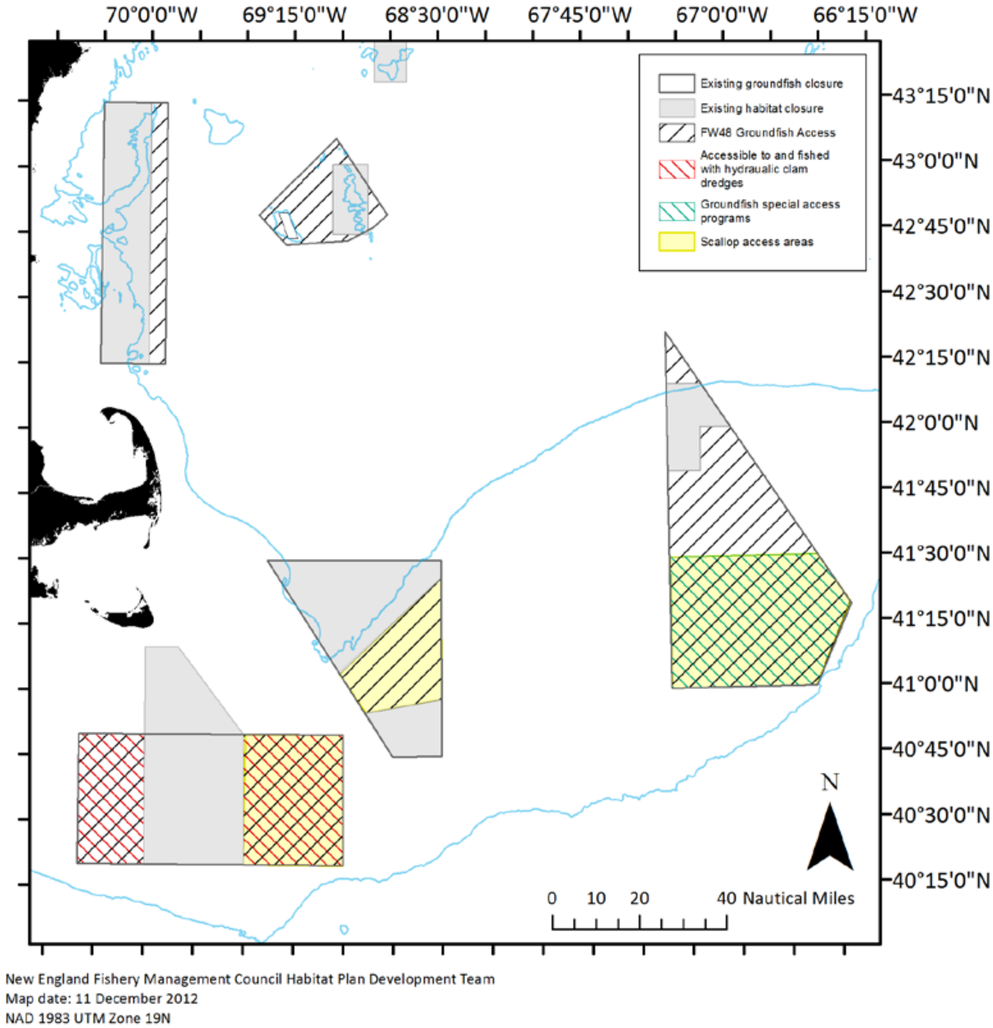
Under Option 2, sectors would be able to request exemptions from portions of the year-round mortality closures. The exemption provision has two elements that could affect the magnitude of impacts across categories (biological, economic, habitat, etc.): the specific boundaries of the exemption areas themselves and the fishery and other resources therein, and the seasonality of the exemptions. In terms of seasonality, the exemption areas in the GOM would not be accessible when overlapping rolling closures are closed, and CAI and CAII would not be accessible from February 16-April 30. It is assumed that the time of year in which impacts occur does not have a major, if any, influence on the magnitude of impacts to EFH, so this element of the exemption provisions will not be discussed further.

Overall, even though a significant amount of fishing effort may shift into the groundfish mortality closures as a result of sector exemption requests, the adverse effects on EFH are not expected to be significant, except perhaps in discrete locations where bottom trawling could impact complex bottom habitats to a greater degree than they are already affected by natural factors.

Impacts within the exemption areas

One way to think about EFH impacts of the proposed action is whether they will increase within the exemption areas themselves. Because the seafloor in a large portion of the exemption areas has not been subjected to any bottom trawling for many years, any amount of bottom trawling in these areas would represent a new source of bottom disturbance with greater potential habitat impacts, whereas reductions in trawling activity in open areas that are currently subjected to bottom trawling would not significantly reduce impacts to benthic habitats. The potential habitat impact of any new fishing activity in the exemption areas will depend on how much of the seafloor is contacted by the gear (per haul or tow), the amount of time the gear is in contact with the bottom, the effective width of the gear, and the frequency of use (number of tows or hauls per unit time). The actual impact depends on how vulnerable seafloor habitats in any particular location are to fishing with a particular gear type (see below). Because they are the principal gear used to harvest groundfish and contact a much greater area of the seabed than fixed gears like bottom gillnets and longlines, bottom trawls are the primary focus of this impact analysis.

Figure 148 – Portions of the exemption areas that have previously been accessed by mobile bottom tending gears



Area	Date closed	Previous access to exemption area portion by mobile bottom tending gear
Western Gulf of Maine Closed Area	1998	None
Cashes Ledge Closed Area	2002	None
Closed Area I	1994	Scallop dredges
Closed Area II	1994	Scallop dredges, specific types of otter trawls
Nantucket Lightship Closed Area	1994	Clam dredges; scallop dredges

A second element of the EFH impact analysis relates to the differential vulnerability of various habitat types to fishing. If a location is highly vulnerable to certain types of fishing activity, there may be habitat impacts concerns even if the magnitude of fishing in an area is relatively small. For this reason, it is important to evaluate the habitat vulnerability of each of the exemption areas.

The habitats of the five exemption areas are described in the Affected Environment section of this document. Through the Omnibus EFH Amendment process, the NEFMC Habitat Plan Development Team (PDT) and Committee have developed options for habitat management areas throughout the region. While this action is not yet finalized, at the current time the data that have been reviewed suggest that, in general, the most vulnerable habitat areas in the region do not overlap with the proposed exemption areas. We can, therefore, conclude that the exemption areas avoid the most vulnerable habitat types in the region, to the extent that these vulnerable areas are accurately known.

The question is whether or not any new fishing activity in these areas will lead to any adverse effects on EFH and if the effects are significant. The EFH regulations define an adverse impact as any reduction in the quantity or quality of EFH. Management actions to minimize the adverse effects of fishing on EFH are not required unless the impacts are more than minimal and not temporary in nature. The Habitat PDT's Swept Area Seabed Impact (SASI) model vulnerability assessment and literature review examined the scientific basis for inferring differences in adverse effects across habitat types and gear types. Specifically, this approach looked at whether structural habitat features were susceptible to particular types of bottom-tending fishing gears, and how long it took those habitat features to recover.

Overall, this analysis suggested that fixed gears are unlikely to have a significant adverse effect on EFH. The literature, although somewhat sparse, indicated that the susceptibility of most seabed features to fixed gear impacts – even in complex bottom habitats – is low. Because initial impacts were expected to be minimal, recovery times to full functional value as structural habitat were estimated to be relatively fast. Thus, if the exemptions authorize fishing in these areas by sector vessels using fixed bottom tending gear (specifically, bottom longlines and gillnets), any impacts on complex bottom habitats are expected to be minimal. If they are used in relatively homogeneous, highly dynamic, habitats (e.g., sandy bottom habitats on Georges Bank), the expected impacts would be negligible.

Mobile gear impacts resulting from scallop dredges and bottom otter trawl gears were estimated to be very similar per unit area, with lesser impacts associated with reduced contact trawl types, particularly raised footrope trawls. However, scallop dredge gear would not be authorized under these exemptions as this gear type is not used during groundfish sector trips. Hydraulic clam dredges have a greater per unit area impact on benthic habitats, but they also would not be authorized for use by sectors seeking access to groundfish exemption areas.

Impacts for the groundfish fishery as a whole

Another way to think about EFH impacts of the proposed action is whether they will increase or decrease fishery-wide as a result of allowing access to the exemption areas. This is much more difficult to evaluate. Without knowing how many and which sectors will request the exemptions and how much fishing effort might be redirected into these areas, it is not possible to be specific in this analysis about the magnitude of the impacts to EFH that might result from authorizing the exemptions. There are numerous potential outcomes in terms of how patterns of fishing effort might change as a result of these requests, and shifts will be different for each of the five exemption areas because fish distributions relative to sector ACE amounts vary across the different areas. Other factors such as distance from port will also affect how much effort will end up being directed at each exemption area.

If sector vessels are able to use fishing opportunities in the exemption areas to target species that are underutilized in general, and bycatch of other species is low such that they would use little of their ACE for quota-limited species to fish in the exemption areas, then effort could increase overall due to the exemption areas. In this case, fishing activity and therefore seabed contact would increase, but catch would also increase. Of course ACLs and ACE values are likely to change between the current fishing year and the coming fishing years, so effort overall may decrease even if exemption area fishing represents primarily new fishing opportunities and not just a redistribution of current activity.

If sector vessels find themselves still constrained by ACE limits such that effort shifts into the exemption areas displace effort elsewhere, then the overall magnitude of fishing effort may remain similar if the exemption provisions are implemented, decreasing if ACLs/ACE decrease. If vessels targeting specific fish in the exemption areas are able to catch these target stocks more efficiently with less fishing time that they could in areas currently open, impacts to EFH could potentially decrease overall.

The magnitude of either increases or decreases in impacts to EFH due to changes in fishing locations and catch rates is highly uncertain.

Factors to consider when evaluating the extent of habitat impacts associated with authorizing a specific exemption request

Has the area been previously been fished by scallop dredges or bottom otter trawls? Areas that have been open to fishing by the gear types of greatest concern (i.e. mobile bottom tending gears) include the part of the CAII exemption area south of 41’ 30° N (scallop dredges used in the access fisheries, trawls used in the SAPs), the entire CAI exemption area (scallop dredges), and the eastern half of the NLCA exemption area (scallop dredges). The NLCA exemption are is open to hydraulic clam dredging, but the footprint of this gear is relatively small. The WGOM and Cashes exemption areas have not been accessed by mobile bottom tending gears since they were closed.

What is the magnitude of natural seabed disturbance in the area? Other factors being equal, habitat areas with low natural disturbance at the seabed are expected to have longer recovery times following most types of fishing disturbance and are, therefore, more vulnerable to fishing. The three Georges Bank exemption areas are largely high energy, dynamic habitats, with the exception of the deepest areas (the southernmost portions of the NLCA exemption area and the northernmost triangle of the CAII exemption area). The WGOM and Cashes exemption areas have low natural disturbance (see Affected Environment).

Are highly vulnerable habitat features known to occur in the area? How much uncertainty is there in the characterization of habitat? Highly vulnerable habitat areas are expected to accumulate more adverse effects than less vulnerable areas. The only exemption area identified as potentially being highly vulnerable by the NEFMC Habitat PDT is the area around Wildcat Knoll in the southern part of the WGOM exemption area. While this area has been surveyed visually, it is relatively poorly mapped such that vulnerable habitat areas in this region cannot be delineated with much certainty. The Habitat PDT has generally identified deep mud areas as being less vulnerable than more complex, hard bottom, habitats, but there are a limited number of studies that support this conclusion. In addition, deep mud habitats in the Gulf of Maine are not well mapped (the spacing between sediment samples is large). Thus, while substantial adverse effects from mobile bottom tending gear on deep mud habitats are not expected, this conclusion is somewhat uncertain and the habitat mapping for these areas could be missing more complex features because the resolution of the underlying data is low. With the exception of Wildcat

Knoll, the WGOM exemption area, as well as the Cashes Ledge exemption area, are likely to contain predominantly mud habitats.

7.2.2.7 Commercial Fishery Accountability Measures

7.2.2.7.1 Option 1: No Action

This option would maintain current AMs, specifically fishing restrictions in stock-areas if ACLs are exceeded, and pound-for-pound penalties in the following year.

Currently SNE/MA winter flounder, N. or S. windowpane flounder, ocean pout, and wolffish cannot be possessed or landed by vessels issued a limited access NE multispecies permit, an open access NE multispecies Handgear B permit, or a limited access monkfish permit and fishing under the monkfish Category C or D permit provisions. NE multispecies vessels can land a single halibut per trip. These possession/landing prohibitions can be viewed as proactive AMs.

7.2.2.7.2 Option 2: Change to AM Timing for Stocks Not Allocated to Sectors *(Preferred Alternative)*

This option would implement AMs for stocks not allocated to sectors at the start of the next fishing year if reliable information is available. It would also specify that AMs would not be implemented mid-year. This measure is intended to balance a quick response to conserve stocks with industry's need to develop annual business plans. Also, if the data so indicate, AMs can be rescinded. This option would apply to the following stocks at the present time, although the list of stocks allocated/not allocated to sectors may change in coming years depending on stock status: SNE/MA winter flounder, N. and S. windowpane, ocean pout, halibut, and wolffish. Because these species are not targeted and already have zero possession limit proactive AMs, changes in the timing of the area-based reactive AMs outlined below is not expected to cause significant shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts.

7.2.2.7.3 Option 3: Area-Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder *(Preferred Alternative)*

Atlantic halibut:

If adopted, this option would (1) require the use of selective trawl gear in specified trawl halibut AM areas, (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear halibut AM areas, and (2) set a zero possession limit for all vessels when the total ACL is projected to be exceeded by an amount that exceeds the management uncertainty buffer. Because halibut is not a target species, a gear-area restriction AM would not be expected to cause significant shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts.

Atlantic wolffish:

If adopted, this option would (1) require the use of selective trawl gear in specified trawl wolffish AM areas, and (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear wolffish AM areas when the total ACL is projected to be exceeded by an amount that exceeds the management uncertainty buffer. The measures would not be in effect during January, February, or March because wolffish next guarding behavior makes them generally unavailable to the fishery at that time. Because wolffish is not a target species, a gear-area restriction AM would not be expected to cause significant shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts.

SNE/MA Windowpane flounder:

If adopted, this option would require the use of selective trawl gear in specified trawl windowpane AM areas when the total ACL is projected to be exceeded by an amount that exceeds the management uncertainty buffer. Because windowpane is not a target species, a gear-area restriction AM would not be expected to cause significant shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts.

7.2.2.7.4 Option 4: Modifications to the Accountability Measures for SNE/MAB Windowpane Flounder *(Preferred Alternative)*

This option would extend the above AM for this stock to non-groundfish trawl vessels. This may have biological benefits because much of the catch of this stock does not occur in the groundfish fishery, but this change would not be expected to cause significant shifts in the magnitude or location of fishing effort and therefore in the magnitude of EFH impacts.

7.2.2.7.5 Option 5: Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

This option would remove trimester TAC provisions for white hake in the handgear A and B permit categories. Because handgear operation has little to no impact on seabed habitats, changes to the accountability measures for this fishery is not expected to have any influence on the magnitude of EFH impacts in the groundfish fishery.

7.2.2.8 Trawl Gear Stowage Requirements

7.2.2.8.1 Option 1: No Action

This option would maintain gear stowage requirements for vessels transiting closed areas.

7.2.2.8.2 Option 2: Removal of Trawl Gear Stowage Requirements *(Preferred Alternative)*

This option would remove stowage requirements for vessels transiting closed areas. Given that VMS is required in the groundfish fishery, it is easier to enforce closed area fishing restrictions now than when the measures were originally implemented. This change is not expected to have any effect on the magnitude of EFH impacts in the groundfish fishery.

7.2.3 Summary of Essential Fish Habitat Impacts of the Preferred Alternatives

Table 82 – Expected EFH Impacts of the Preferred Alternatives relative to the other alternatives. Positive impact indicates a benefit/lesser magnitude of adverse effects to EFH; negative impact indicates a cost/higher magnitude of adverse effects to EFH.

Proposed Measure	**Expected Relative Habitat Impacts**	**Rationale**
Revised status determination criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, white hake	Neutral impact as compared to no action; possible long term positive impact	Revised criteria expected to result in better catch advice and chance at rebuilding over the long term, which may increase catch efficiency and thereby reduce seabed area swept and EFH impacts per amount of catch
SNE/MA windowpane flounder sub-ACLs	Neutral impacts of setting either a scallop or other sub-components sub-ACL; possibly neutral or positive impacts if AMs are triggered	AMs have not been developed for either sub-ACL, but if the AMs (if triggered) lead to a cessation or reduction of fishing in the stock area, this could result in lower seabed area swept and positive EFH impacts, or a spatial redistribution of fishing and neutral EFH impacts.
Scallop fishery sub-ACL for yellowtail flounder	Uncertain impacts compared to no action	It is not known how a redistribution of yellowtail between groundfish and scallop fisheries will affect the overall magnitude of seabed impacts.
Small mesh fisheries sub-ACL for yellowtail flounder	Uncertain impacts compared to no action	Without knowing what the AMs would be, it is difficult to estimate how AMs triggered under this sub-ACL would affect the magnitude or distribution of fishing effort and thereby affect the magnitude of impacts to EFH
Revised recreational AMs	Neutral compared to no action	Recreational hook and line gear has very minimal impacts on EFH
Groundfish monitoring program revisions	Neutral compared to no action	Type and coverage of monitoring used is not expected to have a large effect on the magnitude and distribution of EFH impacts
Commercial fishery minimum size restrictions	Decrease in impacts as compared to no action over the short term; possible increase over the long term	Assuming that catch can be converted to landings, potentially reduced fishing time and area swept as compared to current limits; possible increase in impacts over the long term if there are negative biological consequences and stock sizes and catch rates are reduced
GB yellowtail flounder management measures –revised discard strata	Increase in impacts as compared to no action	If this measure allows more effort in area 522 and elsewhere on other stocks such as haddock, this could increase fishing activity and thereby

		EFH impacts, but would also increase catch
GB yellowtail flounder management measures – small mesh fishery gear requirements	Decrease in impacts as compared to no action	The gear types that would be required tend to have reduced seabed contact and impacts
Sector management provisions – allowed exemption requests	Neutral to negative impacts as compared to no action	There may be localized negative impacts of allowing fishing in some areas that have been closed to groundfish gears, specifically otter trawls, but these may be balanced by increased catch rates and therefore reduced impacts per catch on certain stocks. Overall, adverse effects to EFH resulting from exemption area fishing are not expected to be very large in magnitude, although the magnitude of shifts in fishing effort is highly uncertain, and characterizations of the habitats in some of the exemption areas are moderately uncertain.
Commercial fishery accountability measures	Neutral compared to no action	No significant changes in the amount or location of fishing, and thereby in associated EFH impacts, for any of the AM changes, because stocks are generally not targeted or gears (i.e. handgears) are already very low impact
Trawl gear stowage requirements	Neutral compared to no action	Enforcement of closed area restrictions possible without existing gear stowage requirements, so little to no effect on the magnitude and distribution of EFH impacts

7.3 Impacts on Endangered and Other Protected Species

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

7.3.1.1 Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder and White Hake

7.3.1.1.1 Option 1: No Action

This option would result in no status determination criteria for GOM cod, GB cod, SNE/MA yellowtail flounder and white hake. There would be no GF sub-ACL for these species, which is expected to result in decreased fishing for groundfish. Reduced fishing activity would benefit protected species because of reduced interaction potential. Compared to Option 2, this option would have very low impacts on protected species.

7.3.1.1.2 Option 2: Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder and White hake *(Preferred Alternative)*

This option uses the best available science and as a result is consistent with the M-S Act and National Standard 2. It would allow catches of GOM cod and GB cod to decrease below the catches proposed in FW 47, using the recommendations of the SAW 55 (NEFSC 2013). It would allow catches of SNE/MA yellowtail flounder to decrease below the catches proposed in FW 47, using the recommendations of the SAW 53 (NEFSC 2012). It would allow catches of white hake to remain status quo to the catches proposed in FW 47, pending the recommendations of the SAW 56 (NEFSC 2013).

Compared to the No Action alternative, which would have a very low potential to adversely affect protected species because of a zero groundfish sub-ACL for these stocks, this alternative could adversely effect the protected species present in the areas in which a groundfish sub-ACL will be set. However, the overall impact of this alternative on protected species is expected to be lower due to the decreased catches. A decrease in fishing effort is likely to decrease the catch, and as a result, a potential decrease in incidents of bycatch of protected species may also occur, as well as an increase in the amount of forage available. It is not clear, however, if the circumstances created by the measure will result in these beneficial effects on protected species or where the effort is likely to occur. This option also facilitates the use of analytic assessments, which should lead to a better understanding of the resources and a more accurate determination of sustainable catch levels. It may also lead to better analyses of where effort will occur in the future and therefore improve the ability to predict impacts on protected species.

7.3.1.2 SNE/MA Windowpane Flounder Sub-ACLs

7.3.1.2.1 Option 1: No Action

This would be status quo and would not result in reduced groundfish catch and is not thought to increase negative impacts on protected species. The lack of an AM for the scallop fishery would allow this fishing activity to continue after an overage. Some benefit for protected species may be expected if this additional AM would result in appropriate alterations in fishing activity; without this AM fishing activity is only impacted by the overall groundfish AM, which may provide some benefit for protected species. Option 1 would provide the least benefit to protected species compared to Options 2 and 3.

7.3.1.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL *(Preferred Alternative)*

This alternative proposes the establishment of a windowpane flounder sub-ACL for the scallop fishery. It would reduce the allocation to the other sub-components category and establish a sub-ACL for the scallop fishery with AMs adopted in a future scallop management action during 2013. This alternative is expected to reduce the likelihood of exceeding the groundfish sub-ACL and triggering an AM for the groundfish fishery. The likelihood of an AM being triggered in the scallop fishery is unknown but is thought to be low as the sub-ACL will be based on the 90th percentile of the scallop fishery catches. The impacts on protected species depend on which AM is triggered as an AM can result in a shift in effort to another area. The major concern would be if effort shifts in ways that were not expected when scallop fishing measures are developed. These impacts could be either positive or negative. Options 2 and 3 provide more benefit to protected species than Option 1.

7.3.1.2.3 Option 3: Other Sub-Components Sub-ACL *(Preferred Alternative)*

The establishment of an other sub-components sub-ACL would allow AMs to be established and applied to other fisheries. The impacts on protected species would depend on which component of the fishery exceeds its ACL. The area-based AM would be applied to the groundfish fishery or the sub-components in other fisheries depending on which component exceeds the ACL provided that the overall ACL for this stock is exceeded by an amount that exceeds the management uncertainty buffer. The impacts on protected species are dependent on the effect an AM would have on fishing effort distribution as it could have either positive or negative effects depending on the area fished. Options 2 and 3 provide more benefit to protected species than Option 1.

7.3.1.3 Scallop Fishery Sub-ACL for Georges Bank Yellowtail Flounder

7.3.1.3.1 Option 1: No Action

This option would result in no changes to the scallop GB yellowtail flounder sub-ACL determination. The sub-ACL would be flexible and the basis of determination could vary; this may have positive or negative interactions with protected species depending on basis of determination. Accordingly, Option 1 could have more or less impacts on protected species compared to Options 2 and 3.

7.3.1.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Based on Estimated Catch

This alternative is based on the estimated needs of the scallop fishery and could result in higher scallop catch and increased interactions with protected species. Option 2 may have greater impacts on protected species than Option 3 and may potentially be similar to Option 1.

7.3.1.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Based on Catch History *(Preferred Alternative)*

This alternative is based on the catch history of the scallop fleet and would represent a fixed percentage of the overall GB yellowtail flounder ABC. As this number may be lower than the estimated needs of the scallop fishery in any one year, the impacts on protected species would be expected to be lower than Option 2 and more consistent over time. If an AM is triggered, fishing effort may be shifted to other areas resulting in either negative or positive impacts on protected species depending on the area considered. Option 3 would have lower impacts on protected species than Options 1 and 2.

7.3.1.4 Small Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

7.3.1.4.1 Option 1: No Action

No small mesh fisheries sub-ACL for GB yellowtail flounder; the only AM would remain the groundfish AM and would not limit interactions between small mesh fisheries and protected species on GB with potential for negative impacts on protected species. Option 1 would have negative effects on protected species compared to Option 2, but would not be different than the status quo. The extent of these impacts would depend on the interactions between small-mesh bottom trawls and protected species.

7.3.1.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder *(Preferred Alternative)*

This alternative proposes the establishment of a GB yellowtail flounder sub-ACL for small-mesh fisheries. It would reduce the allocation to the other sub-components category and establish a sub-ACL for the small-mesh fishery with AMs developed in future management actions under the relevant FMPs. This alternative is expected to reduce the likelihood of exceeding the groundfish sub-ACL and triggering an AM for the groundfish fishery. The likelihood of an AM being triggered in the small mesh fisheries is unknown but is thought to be low as the sub-ACL will be a percentage based on recent catch history. The impacts on protected species will depend on how the AM is designed. The major concern would be if effort shifts in ways that were not expected when small-mesh fishing measures were developed. These impacts could be either positive or negative. Option 2 has more positive effects on protected species than Option 1.

7.3.2 Commercial and Recreational Fishery Measures

7.3.2.1 Management Measures for the Recreational Fishery

7.3.2.1.1 Option 1: No Action

If this option is adopted, whether there would be any impacts on endangered or other protected species depends on whether the AM is implemented or whether fishing behavior is changed in anticipation of the AM. Recreational fishing, generally, is assumed to have very minor impacts on endangered or protected species.

The AM for the recreational fishery is reactive; changes to measures are implemented after the sub-ACL for a stock has been exceeded. This AM would not be expected to affect fishing activity during the FY when the overage occurs and would not be expected to have direct impacts on protected species. When compared to Option 2, this measure would not result in any changes in fishing effort and would not be expected to have any differential impacts on protected species.

7.3.2.1.2 Option 2: Revised Accountability Measure for the Recreational Fishery *(Preferred Alternative)*

This option would allow the Regional Administrator to modify recreational measures in order for the recreational fishery to reach its sub-ACL but not exceed it. For cod, consideration would be given, in order, to increase minimum size limits, adjust seasons and change bag limits. For haddock, consideration would be given, in order, to increase minimum size limits, change bag limits and adjust seasons. This AM would modify measures prior to the start of the fishing year and impact fishing activities that could increase or decrease impacts on protected species, depending on how the measures change fishing activity. It could result in fewer impacts on protected species as it is a proactive AM that allows modifications to be put in place to help prevent the sub-ACL from being exceeded. Option 2 could have positive impacts on protected species compared to Option 1.

7.3.2.2 Groundfish Monitoring Program Revisions

7.3.2.2.1 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. While the increased coverage levels that resulted may have provided additional information on encounters between fishing activity and protected and endangered species, the elements of the program were designed for that purpose. This option is analyzed by comparing the No Action measures to the specific alternatives that are being considered.

This option would not clarify monitoring program goals and objectives. This would not be expected to have a direct impact on any protected or endangered species. When compared to Option 2, this option might result in a monitoring program that is less focused and as a result is less efficient, which may have a small negative effect on the collection of information on fishing encounters with protected or endangered species when compared to Option 2.

This option would not clarify the application of the CV standard for monitoring groundfish discards in sectors. Whether this would lead to more or less observer/ASM coverage than Option 3 is not clear. As presently interpreted by NERO, the CV standard is being applied to most, but not all, sector strata. When compared to sub-option 3A1, this option would provide more ASM coverage. This could provide additional information on interactions with protected or endangered species. When compared to sub-option 3A2, however, this option would provide less coverage and as a result less information on interactions.

This option would maintain the requirement that the industry fund ASM in FY 2013 and beyond. The impacts on protected and endangered species are unclear. The funding requirement is an administrative measure that would not be expected to have direct impacts on protected or endangered species. If this measure results in a lowering of observer and ASM coverage because of an industry inability to fund coverage, there could be less information available for monitoring protected species than would be the case under Option 3B.

This option would require the industry fund DSM in FY 2013. This measure would not be expected to have any direct or indirect effects on protected or endangered speices, and these imapcts would not differ from those in Option 4.

7.3.2.2.2 Option 2: Monitoring Program Goals and Objectives *(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 any improvements to the program would improve the quality of data collected potentially providing more data on protected species. Option 2 has low impacts on protected species compared to Options 1, 3 and 4.

7.3.2.2.3 Option 3: ASM Coverage Levels

<u>Sub-Option A: Clarification of CV Standard</u> *(Preferred Alternative)*

If the application of the CV standard is changed it may have positive impacts on protected species. If it results in increased observer coverage, it may provide improved data on protected species. If observer coverage was to decrease because a sufficient data level was identified then no negative impacts on protected species would be expected.

<u>Sub-Option B: Removal of Requirement for Industry-Funded At Sea Monitoring for FY 2013</u> *(Preferred Alternative)*

This option removes the requirement for industry funding of at-sea monitoring in FY 2013. At-sea monitoring is essential to provide accurate information on discards, particularly in regards to protected species, which cannot be landed. Without this information there will be more uncertainty on fishing mortality estimates and as a result a greater likelihood that the assessment of the stocks will be wrong.

The impacts of this option are unclear because the funding options for monitoring, absent industry funding, are unclear. The federal government may provide the funding necessary for an adequate at-sea monitoring program that achieves the standards required by NMFS, including the SBRM CV standard specified as a minimum by the Council. If this occurs, then there would be no difference between this option and the No Action alternative for protected species, as the SBRM coverage levels would be maintained. If the federal government were to provide a lower level of funding than that required to meet monitoring standards, then documentation of encounters with protected species may decrease. Negative effects on protected species are not expected under this option. At the time of this writing, however, the level of funding, and therefore the level of coverage, is uncertain, and so the impacts of this option cannot be fully evaluated.

Sub-Option C: Lower coverage rates for sector trips on a Monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear *(Preferred Alternative)*

These trips have low groundfish catch but may reduce data collected on protected species for this gear type. It may also provide incentive to increase fishing activity in this area resulting in increased interaction with protected species.

7.3.2.2.4 Option 4: Industry At-Sea Monitoring Cost Responsibility *(Preferred Alternative)*

This option restricts industry funding responsibility for at-sea monitoring to direct at-sea monitor (ASM) costs; specifically to the daily salary of the at-sea monitor. The remainder of the costs for ASM and associated programs would continue to be supported entirely by NMFS. ASM is essential to provide accurate information on discards, particularly in regards to protected species, which cannot be landed. Without this information there will be more uncertainty on fishing mortality estimates and as a result a greater likelihood that the assessment of the stocks will be wrong.

The impacts of this option are unclear because the funding options for the indirect monitoring costs are unclear. The NMFS may provide funding for these indirect costs to ensure the monitoring program is adequate to achieve the required standards. Comparison with option 1 needed. This option is difficult to compare to the other options as it is funding related while Option 1 is TBD and Option 2 is administrative. Option 3 is considered to have some impacts on protected species.

7.3.2.3 Dockside Monitoring Requirements

7.3.2.3.1 Option 1: No Action

Dockside monitoring does not affect protected species; this option is therefore not expected to have impacts on protected species. Options 1 and 2 are not expected to affect protected species.

7.3.2.3.2 Option 2: Elimination of Dockside Monitoring Requirement *(Preferred Alternative)*

This option removes the requirement for all dockside monitoring for groundfish trips beginning in FY 2013. Dockside monitoring does not affect protected species; this option is therefore not expected to have impacts on protected species. Options 1 and 2 are not expected to affect protected species.

7.3.2.4 Commercial Fishery Minimum Size Restrictions

7.3.2.4.1 Option 1: No Action

This option would not change the minimum fish size restrictions. Depending on changes to fishing regulations described above, this measure is not considered to impact on protected species. Compared to Options 2 and 3, this option would have low impacts on protected species.

7.3.2.4.2 Option 2: Changes to Minimum Size Limits *(Preferred Alternative)*

This option would lower the minimum size limits for species listed in section 4.2.3.2 for sector and common pool vessels. Sector vessels would be required to land all legal sized allocated groundfish but some discarding may occur on common pool vessels as trips are governed by trip limits. This measure was designed to reduce regulatory discards. The impact on protected species should be minimal as the mesh size is not changing and reduced regulatory discards may allow sector vessels to achieve their allocation with reduced fishing effort. Option 2 would have similarly low impacts on protected species as Option 1 and 3.

7.3.2.4.3 Option 3: Full Retention

This option would require sector vessels to land all regulated groundfish of all sizes, i.e. no discarding of non-prohibited species. This measure was designed to reduce regulatory discards. The impact on protected species should be minimal as the mesh size is not changing and reduced regulatory discards may allow sector vessels to achieve their allocation with reduced fishing effort. Option 3 would have similarly low impacts on protected species as Option 1 and 2.

7.3.2.5 GB Yellowtail Founder Management Measures

7.3.2.5.1 Option 1: No Action

This option would not alter existing measures for GB yellowtail flounder and is not expected to impact protected species. Compared to Options 2 and 3, this option would have low impacts on protected species.

7.3.2.5.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder *(Preferred Alternative)*

This option alters the stratification used for estimating discards of GB yellowtail flounder for in-season quota monitoring. If adopted this measure would allow fishing to continue in statistical area (SA) 522, an area that has been identified as having low abundance of yellowtail flounder, when the allocation is almost reached. This measure may increase interactions with protected species in this statistical area if a large amount of fishing effort shifts to the SA once the allocation is almost reached. Protected species in the remaining GB yellowtail flounder statistical areas may benefit from reduced impacts if fishing does shift from these areas. This option could have similar impacts on protected species as Option 3 but potentially more than Option 1.

7.3.2.5.3 Option 3: Small-Mesh Fishery Bottom Trawl Gear Requirements *(Preferred Alternative)*

This option would require small mesh fishery to use a modified gear to reduce the catch of flounders in statistical areas 522, 525, 561 or 562 when on a non-groundfish trip. The modified gears would not be expected to impact on protected species as they're not designed to avoid protected species bycatch. The gears could modify fishing activity if more yellowtail flounder become available for sector vessels potentially prolonging fishing if yellowtail flounder allocation is less restrictive. This could have increased impacts on protected species. This option could have similar impacts on protected species as Option 2 but potentially more than Option 1.

7.3.2.6 Sector Management Provisions – Allowed Exemption Requests

7.3.2.6.1 Option 1 – No action

No action would keep vessels using gears capable of catching regulated groundfish from fishing in the year round closed areas, with some exceptions for SAPs and experimental fishing. Except for changes in fishing activity that would occur if sector catches approach the sector's sub-ACLs, causing sector vessels to change target species and avoid catching certain stocks of groundfish, fishing activity would not substantially change or have different impacts on sea turtles, Atlantic sturgeon, or marine mammals compared to status quo. Impacts on protected species from sector vessels targeting other species due to ACL adjustments is discussed in Section 7.3.

7.3.2.6.2 Option 2 – Exemption from year round mortality closures *(Preferred Alternative)*

Summary

Impacts on protected resources will depend greatly on effort shifts that result from access to areas previously closed. Marine mammals and sea turtles can be found in and around all the closed areas. Atlantic sturgeon, on the other hand, are more prolific in shallower, near-shore waters. Based on data identifying where species occur, it is anticipated that the two areas of most concern would be the WGOMCA and NLCA for both Atlantic sturgeon and harbor porpoise; these areas would also be of concern for endangered large whales and sea turtles. Gillnet gear is primarily responsible for most of the takes of these animals in these areas. This action allows sectors to request exemptions from the closed areas; the impacts to protected species due to the opening of any of the year round mortality closures will be analyzed in a separate action.

Sea Turtles

As coastal water temperatures warm in the spring, sea turtles begin to migrate up the U.S. Atlantic coast, occurring in Virginia foraging areas as early as April/May and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September, but some turtles may remain in Mid-Atlantic and Northeast areas until late fall.

Sea turtle takes have been observed in both scallop dredge and bottom trawl gear on Georges Bank, and a single take has been observed in gillnet gear in the Gulf of Maine. Less than 10 takes of sea turtles have been documented in these gears in these areas. Species observed include loggerhead and Kemp's ridley sea turtles. The Sea Turtle Disentanglement Network has documented entanglements in fishing gear from Maine through Virginia. Most entanglements over the past five years have been in vertical line gear and were leatherback sea turtles.

Sea turtle bycatch over Georges Bank and in the Gulf of Maine has been documented, but to a lesser extent than in the mid-Atlantic where hard-shelled sea turtles are more commonly found. If the areas are opened to groundfish gear when sea turtles are present, the impacts would depend on changes in the magnitude and distribution of fishing effort as a result of these openings. There are a number of ways that effort could shift. It could shift temporally, spatially, and potentially between the different gear types. In general, shifts in effort to areas farther south would likely increase impacts to sea turtles. Also, sea turtles are only present in the Northeast Region seasonally. Therefore, increases in effort from late spring through fall, when sea turtles are present in the area, would also be expected to increase the impacts to sea turtles. However, if effort were to shift from areas with higher bycatch rates to those with lower rates, there may be a benefit to sea turtles.

Atlantic Sturgeon

All five distinct population segments (DPSs) share a common marine range although the distribution of each may vary within that range as evidenced by genetics analyses. Atlantic sturgeon occur primarily in waters less than 50m (although deeper waters are also used), aggregate in certain areas, and exhibit seasonal movement patterns (Stein et.al, 2004; Dunton et. al., 2010; Erickson et. al, 2011).

Opening the Western Gulf of Maine Closed Area (WGOMCA) would be of concern given its proximity to waters where Atlantic sturgeon are known to transit and where incidental takes have been documented. Similarly opening the Nantucket Lightship Closed Area (NLCA) would pose some concern, particularly for the western area. Opening Cashes Ledge Closed Area (CLCA), Closed Area I (CA I), and Closed Area II (CA II) pose less of a concern given that none are known to be a concentration area for sturgeon. Any action that increases gillnet gear in areas where Atlantic sturgeon are likely to occur would be of concern given bycatch mortality in this gear. That concern might be alleviated, however, if we knew effort was being shifted from an area where Atlantic sturgeon are more likely to occur.

Marine Mammals

There are some marine mammal concerns with regard to opening some of the year-round closure areas, which can be discussed. The biggest areas of concern are the WGOMCA for endangered whales and for harbor porpoises and gillnet gear, and possibly the NLCA. Allowing access to trawl gear in both CA I and CA II could have implications for marine mammals like pilot whales, Atlantic white-sided, common, and bottlenose dolphins. While large whales have been sighted in all of the closed areas, the areas with the highest sightings numbers appear to be WGOMCA and CLCA, and CA I.

Conducting analyses of impacts on marine mammals of opening these closure areas largely depends on how effort will shift into these areas and where this effort will shift from (e.g., will effort just be more spread out, will risk increase in these areas and decrease elsewhere, etc.). It also depends on whether overall effort will decrease, remain the same, or increase. Impacts could also arise from changes in effort for other fishing gear currently present within these areas if this gear/effort is expected to shift elsewhere to avoid conflicts with new gear being allowed into these areas (e.g., shifts in lobster gear).

7.3.2.7 Commercial Fishery Accountability Measures

7.3.2.7.1 Option 1: No Action

This would not change the AM timing and would delay any impacts on protected species. Option 1 would have similar impacts on protected species as Option 2 but impacts would occur at a later period. Option 1 has more impacts on protected species than Options 3 – 5.

7.3.2.7.2 Option 2: Change to AM timing for Stocks not allocated to sectors *(Preferred Alternative)*

This option would change the timing of the AM for non-allocated stocks (ocean pout, northern windowpane flounder, southern windowpane flounder, Atlantic wolffish, Atlantic halibut and SNE/MA winter flounder) from the second year after the overage occurs to the first year after the overage depending on the timeliness of data availability. The impacts on protected species depend on whether an AM is triggered as an AM can result in a shift in effort to another area. The major concern would be if effort shifts in ways that were not expected when the area-based AMs are developed. These impacts could be either positive or negative. Option 2 would have similar impacts on protected species as Option 1 but less protection than Options 3-5.

7.3.2.7.3 Option 3: Area-Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder *(Preferred Alternative)*

This option would establish an area-based AM for Atlantic halibut, Atlantic wolffish and SNE/MA winter flounder that would require vessels to use approved selective trawl gear to reduce the catch of flounders and halibut and sink gillnets and longline vessels would not be allowed into the AM areas. The gear restrictions under the AM would decrease impacts on protected species. Any unforeseen shift in fishing effort to areas outside the AM areas, may increase fishing activity and impacts on protected species. Options 3 and 4 have similar impacts on protected species.

7.3.2.7.4 Option 4: Modifications to the Accountability Measures for SNE/MA Windowpane flounder *(Preferred Alternative)*

This option would apply the AM to other fisheries that harvest a large portion of SNE/MA windowpane flounder other than groundfish fishery. This measure is designed to help prevent overfishing on flounder stocks. Similar to Options 2 and 3, if the AM was implemented it could decrease impacts on protected species across multiple fisheries. Any unforeseen shift in fishing effort to areas outside the AM areas, may increase fishing activity and impacts on protected species.

7.3.2.7.5 Option 5: Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

This option would exempt hook gear fishery from the trimester TAC provisions for white hake if the catches by these vessels are less than one percent of the common pool catch of that species or stock. It allows hook gear fishermen to continue fishing on allocated stocks and not be penalized for something that comprises a low portion of their catch. This is not expected to shift or greatly modify fishing behavior and their gear has not been identified in entanglements, etc. so impacts on protected species are expected to be minimal.

7.3.2.8 Trawl Gear Stowage Requirements

7.3.2.8.1 Option 1: No Action

This is an enforcement measure that is not considered to greatly impact on protected species. It would facilitate enforcing prohibitions on fishing within a closed area, which could reduce illegal fishing activity in these areas and decrease impacts on protected species. Options 1 and 2 would have no impact on protected species.

7.3.2.8.2 Option 2: Removal of Trawl Gear Stowage Requirements *(Preferred Alternative)*

This measure would remove the requirement that trawl vessels transiting closed areas stow their gear in a manner described by the Regional Administrator on groundfish trawl fishing trips. This is an enforcement measure that is not considered to greatly impact on protected species. Technology is available that facilitates monitoring of fishing in the closed areas, which helps reduce illegal fishing activity in these areas and decrease impacts on protected species. Options 1 and 2 would have no impact on protected species.

7.4 Economic Impacts

7.4.1 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 agency of the federal government 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 Magnuson-Stevens Act stipulates that the social and economic impacts to all fishery stakeholders should be analyzed for each proposed fishery management measure in order to provide advice to the Council when making regulatory decisions (Magnuson-Stevens Section 1010627, 109-47).

The National Marine Fisheries Service (NMFS) provides a series of guidelines to be used 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 (Guidelines for Economic Review of National Marine Fisheries Services Regulatory Actions, 2007). Where possible, cumulative effects of regulations are identified and discussed. Other social concerns will be discussed in the subsequent social impacts section of this Environmental Assessment. The economic impacts presented here will consist of both qualitative and quantitative analyses dependent on available data, resources, and the measurability of predicted outcomes. In general the regulations proposed in Framework 48 will impact revenue through changes to ACLs and fishery measures and will impact operating costs through the modification of accountability measures, sub-ACLs, and monitoring requirements/cost responsibilities. It is assumed throughout this analysis that changes in revenues will have downstream impacts on income levels and employment; however these are only mentioned if directly quantifiable.

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

7.4.2.1 Revised Status Determination Criteria for GOM Cod, GB Cod, SNE/MA Yellowtail Flounder, and White Hake

7.4.2.1.1 Option 1: No Action

Groundfish Fishery

Under Option 1, the existing status determination criteria (SDC) set forth in Amendment 16 for GOM cod, GB cod, SNE/MA yellowtail flounder, and white hake would persist. This is not expected to have any immediate economic impacts since it does not alter the current methodology used for setting the acceptable biological catch (ABC) for each species. Long term impacts of Option 1 would be that biomass targets will be based on outdated information from the GARM III assessment. This does not constitute the use of best scientific information as stipulated by the Magnuson Stevens Act (Magnuson-

Stevens 101-627, 104-297), and it is probable that ignoring the new SDCs determined by the latest stock assessments will result in overfishing. That is clearly the case with SNE/MA yellowtail flounder, for which the new assessment has already been completed. Over time using the existing SDCs would likely cause a decline in groundfish stocks, which would have a negative economic impact to fishermen through reduced catchability and lower annual catch limits (ACLs).

7.4.2.1.2 Option 2: Revised Status Determination Criteria for GOM Cod, GB Cod, SNE/MA Yellowtail Flounder, and White Hake *(Preferred Alternative)*

Groundfish Fishery

Option 2 adopts, for the FMP, the SDCs set forth in the 2012 assessment updates for the species under consideration. This would have an impact on how the ACLs are set for each stock. In the short term, the new SDCs result in lower ACLs for these species, and fishermen may experience lower net revenues as a result of anticipated catch reductions.

Option 2 is expected to have positive long-term stock benefits through the prevention of overfishing, which would translate into higher and more sustainable future landings than expected under the No Action alternative.

7.4.2.2 SNE/MA Windowpane Flounder Sub-ACLs

7.4.2.2.1 Option 1: No Action

Groundfish and Scallop Fisheries

Option 1/No Action would not create any new sub-ACLs for SNE/MA windowpane flounder. Since this option maintains the status quo, it would not have any new economic impact for either the groundfish or scallop fisheries. The groundfish fishery would continue to be subject to an AM for any overage of the SNE/MA windowpane flounder ACL, regardless of which fishery caused the overage. When compared to Option 2 and Option 3, this option is more likely to result in measures that will have adverse economic effects on the groundfish fishery through the implementation of AMs if the SNE/MA windowpane flounder ACL is exceeded. In contrast, the scallop and other fisheries are less likely to have restrictions as a result of SNE/MA windowpane flounder overages and when compared to Options 2 and 3, these other fisheries would benefit from this option.

7.4.2.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL (*Preferred Alternative*)

Groundfish Fishery

Option 2 would create a SNE/MA windowpane flounder sub-ACL for the scallop fishery. This would impose an AM on the scallop fishery in the event of overages to their sub-ACL. This option will likely have a positive economic impact on the multispecies fishery, since the multispecies fishery would no longer bear the costs of the AM when an overage to the overall ACL is triggered by the scallop fishery. This option would also reduce the uncertainty of overages, which is a potential cost savings because it allows for better business planning.

Conversely, the scallop fishery would absorb the cost of any overage to their sub-ACL, and if their allocation is set below their historical catch levels, they may experience a reduction in revenues. From an efficiency standpoint, a scallop sub-ACL would incentivize new selective technologies and avoidance strategies of SNE/MA windowpane flounder in order to maximize scallop landings. It is difficult to quantify these impacts since the probability of overages is unknown.

By distributing accountability for overages across the multispecies and scallop fisheries, Option 2 is expected to reduce the chance of an overage to the overall ACL. This would help prevent overfishing which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land windowpane flounder.

Scallop Fishery

If this option is adopted, a sub-ACL of SNE/MA windowpane flounder would be allocated to the scallop fishery. There are no direct impacts on the scallop fishery from adoption of a sub-ACL at present. However, adoption of a sub-ACL in this action means that the scallop FMP will be modified in a future action to adopt AMs for this stock. In general, AMs tend to impact fishing behavior in future years if there is an overage and could increase the costs of fishing for the scallop fishery if effort is shifted to months and areas where scallop abundance is lower. The impacts of potential windowpane AMs will be assessed in the future scallop action that considers them.

7.4.2.2.3 Option 3: Other Sub-Components Sub-ACL *(Preferred Alternative)*

Groundfish Fishery

Option 3 would create a SNE/MA windowpane flounder sub-ACL for other sub-components set at its current allocation. This would remove any direct cost to the multispecies fishery resulting from overages to the overall ACL caused by other fisheries. This reduction in the risk of an overage is a potential cost savings, since it allows for better business planning. The other sub-components fisheries would experience increased costs if their landings exceed their allocation under this option. Economic impacts resulting from the AM are discussed further in the economic impacts analysis for the SNE/MA windowpane flounder AM (section 7.4.3.6.4)

By distributing accountability for overages across the multispecies and other sub-components fisheries, Option 2 is expected to reduce the chance of an overage to the overall ACL. This would help prevent overfishing, which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land windowpane flounder.

Scallop Fishery

There are no expected economic impacts from this Option on the scallop fishery.

7.4.2.3 Scallop Fishery Sub-ACL for GB Yellowtail Flounder

7.4.2.3.1 Option 1: No Action

Groundfish Fishery

Option 1 would not change the way the scallop fishery sub-ACL for GB yellowtail flounder is determined. Since this option maintains the status quo, it does not have any new economic impact. There is an existing cost to both the multispecies and scallop fisheries resulting from the uncertainty associated with setting the scallop sub-ACL from year to year.

Scallop Fishery

Option 1 does not specify a specific amount for the scallop fishery and does not establish an automatic adjustment to the allocation. Under this option, the amount of GB yellowtail flounder allocated to the scallop fishery would be determined when groundfish and scallop fishery specifications are set, taking into account consideration of groundfish stock conditions and scallop fishery conditions when setting the sub-ACL. If the estimates for the stock conditions and expected bycatch are accurate, and if the scallop fishery is allocated either the full-amount (about 85.3 mt in 2013 and 127 mt in 2014, Table 83 and Table 84) or close to the full-amount of the expected yellowtail catch, this option would minimize the risks of triggering AMs for the scallop fishery with no significant economic impacts. Although the economic impacts analysisof the yellowtail sub-ACLs focus on the preferred specification alternative (ALT 2) in Framework 24 to the Sea Scallop FMP, the results are also presented for the other FW24 specification alternatives including No Action, ALT 1, ALT 3 and ALT 4 in Table 83 to Table 84 below.

However, if the yellowtail bycatch estimates prepared by the Scallop PDT for the scallop fishery are underestimated, or actual catch comes close to the "high" estimates, the sub-ACL could be exceeded and trigger AMs resulting in closure of Statistical Area 562 during certain months according to the schedule shown in Table 85. This is a valid risk under Option 2 and Option 3 as well, so the following analysis would be applicable to those options too when AMs are triggered. The differences between the three options have to do with the risks for triggering the AMs, as discussed below in comparing those options.

The AM triggers would have minimal impacts on the scallop fishery as long as YT catch does not exceed the sub-ACL by more than 14%. That is because Scallop FW24 is proposing to modify the GF access area seasonal closure from Feb 1-June 14 to Aug 15-Nov 15. If that modification is approved, CAII would be closed from Aug15-Nov15 regardless of any potential overage. Scallop FW 24 describes the revised GB access schedule as a proactive measure aimed at closing CAII to scallop fishing when the yellowtail bycatch rates are high, potentially reducing the need for more stringent reactive AMs. At overage rates of 56% or less, CAII would be open to scallop fishing part of the year, so vessels could be moved to other months, at the minimum between February and June when the area would be open to fishing. Shifting landings to the other seasons would reduce the flexibility for vessel owners to choose where and when to fish, with a possible increase in fishing costs. On the other hand, shifting effort to other seasons when the meat weights are highest could benefit the scallop resource and increase landings and revenues long-term, to some extent offsetting the negative effects of the effort shifts.

As a worst case scenario, if the yellowtail flounder overage is greater than 56%, there would be no scallop fishery access to CAII; revenues would decline by $16.2 million and total economic benefits could decrease by $16.9 million with the preferred alternative in Framework 24 (ALT 2) in 2014 fishing year

(Table 86 and Table 87). Although Framework 24 is a one-year action and the next framework may revise the open area DAS and access area trip allocations, these amounts represent the potential loss under the worst case scenario of a total CAII closure in 2014, since without such an AM trigger, the vessels would optimally have been given the advantage to fish in that area (if the resource conditions were similar to what is predicted at this point in time).

Table 83 –Summary of GB YT catch estimates for the various scallop specification alternatives for 2013 *

2013	**No Action (mt)**	**Alt 1 (mt)**	**Alt 2 (mt)**	**Alt 3 (mt)**	**Alt 4 (mt)**
Gbop	34	34	34	34	34
GBC1	0	2.6	2.3	0	2.1
GBC2	97	70	49	56	19
GBTOTAL	**132**	**106.6**	**85.3**	**90**	**55.1**
% US ABC = 215 mt	61%	49%	40%	42%	26%
% US ABC = 495 mt	27%	21%	17%	18%	11%

* Source: FW 24 to the scallop FMP

Table 84 - Summary of GB YT catch estimates for the various scallop specification alternatives for 2014

2014	**No Action (mt)**	**Alt 1 (mt)**	**Alt 2 (mt)**	**Alt 3 (mt)**	**Alt 4 (mt)**
Gbop	43	42	42	42	42
GBC1	0	0	0	0	0
GBC2	144	81	85	66	28
GBTOTAL	**186**	**123**	**127**	**108**	**71**
% US ABC = 215 mt	87%	57%	59%	50%	33%
% US ABC = 495 mt	38%	25%	26%	22%	14%

Table 85 - Current GB AM schedule under Framework 23 for years when Closed Area II is open (All limited access vessels excluding IFQ vessels) and 2011 scallop catch in SA562

GB YT AM Schedule (LA vessels only)		Scallop landings in Area 562	% of Total Scallop landings in area 562
Overage	**LA Closure**		
3% or less	Oct-Nov	672,923	12%
3.1-14%	Sept-Nov	1,387,998	24%
14.1-16%	Sept-Jan	1,423,698	25%
16.1-39%	Aug-Jan	2,716,060	47%
39.1-56%	Jul-Jan	2,925,250	51%
Greater than 56%	All year	5,739,555	100%

Table 86 - Economic impacts of a closure of the CAII on landings and revenues

Alternatives	Year	Decline in Scallop Landings with CAII Closure	Estimated Price (not adjusted for inflation)	Decline in Estimated Revenue ($ million)	Decline in PV of Revenue ($ million)	Revenue from all areas without Closure ($ million)	Decline in Scallop Revenue as a % of Total Revenue
Alt 1	2013	3,406,000	$10.24	34.9	33.9	382.0	8.9%
	2014	960,000	$10.23	9.8	9.3	372.3	2.5%
Total for 2013-2014		4,366,000		44.7	43.1	754.3	5.7%
Alt 2	2013	2,366,000	$10.29	24.4	23.6	382.0	6.2%
	2014	1,635,000	$10.21	16.7	16.2	373.6	4.2%
Total for 2013-2014		4,001,000		41.1	39.9	755.5	5.3%
Alt 3	2013	2,448,000	$10.23	25.0	24.3	358.1	6.8%
	2014	975,000	$10.23	10.0	9.7	375.2	2.5%
Total for 2013-2014		3,423,000		35.0	34.0	733.4	4.6%
Alt 4	2013	900,000	$10.33	9.3	9.0	362.8	2.5%
	2014	756,000	$10.22	7.7	7.5	366.0	2.0%
Total for 2013-2014		1,656,000		17.0	16.5	728.8	2.3%

Table 87 - Economic impacts of a CAII closure on economic benefits from the Scallop Fishery (All the monetary values are shown in terms of present value of discounted benefits using a rate of 3%) *

Alternatives	Year	Decline in Producer Surplus (PV, Million $)	Decline in Consumer Surplus (PV, Million $)	Decline in Total Benefits (PV, $ Million)	Total benefits without closure (PV, $ Million)	% Decline in total benefits
Alt 1	2013	31.0	4.0	35.1	375.4	9.3%
	2014	8.6	1.1	9.7	369.6	2.6%
Total for 2013-2014		39.6	5.1	44.7	745.0	6.0%
Alt 2	2013	21.8	2.8	24.6	376.8	6.5%
	2014	15.0	1.9	16.9	370.6	4.6%
Total for 2013-2014		36.8	4.8	41.5	747.4	5.6%
Alt 3	2013	22.3	2.9	25.2	352.3	7.2%
	2014	9.0	1.2	10.1	373.0	2.7%
Total for 2013-2014		31.3	4.1	35.3	725.3	4.9%
Alt 4	2013	8.3	1.1	9.4	358.0	2.6%
	2014	7.0	0.9	7.9	364.1	2.2%
Total for 2013-2014		15.3	2.0	17.3	722.1	2.4%

* Source: FW24 to the Scallop F<P

One complicating issue is that not all scallop vessels would be impacted the same from an AM being triggered on GB. For example, if there is an overage of more than 56% of the 2013 GB sub-ACL, all CAII trips in 2014 would be prohibited if there is reliable information to estimate the YT catch before the start of the 2014 fishing year. FW24 does not set 2014 access area allocations, a separate action will be developed in 2013 that will set 2014 specifications (Scallop FW25). If the estimates of CAII biomass are similar to what they are now, only 109 out of 324 full-time equivalent limited access vessels will be allocated trips in CAII in 2014. Since there is currently insufficient biomass in most scallop access areas to allocate a full 18,000 pound trip to all limited access vessels, the FMP has been allocating "split-trips," where vessels are allocated trips into different access areas based on the available catch per area. Therefore, there is potential for these impacts to be disproportional within the scallop fishery, unless trips are allocated differently for 2014 CAII scallop access area trips. These issues will be taken into consideration in the scallop action developed next year.

Overall the No Action alternative could have the greatest economic benefit for the scallop fishery, if consideration of the recent conditions leads to a sub-ACL that is close to the estimated yellowtail catch by the scallop fishery. This would reduce the risk of the sub-ACL being exceeded and potentially triggering AMs, which potentially have negative impacts on the scallop fishery. Still, there is no guarantee under this action that the scallop fishery would receive a sub-ACL that is large enough and not result in AM triggers. Under this option, the Council would also take into account groundfish fishery specifications and potential impacts.

In addition, when compared to the other options, the No Action alternative has a greater degree of uncertainty regarding the level of sub-ACL that would be allocated for the scallop fishery. This could make it difficult to plan scallop actions proactively in order to minimize the impacts of AM triggers on the economic benefits from the scallop fishery. From this perspective, Option 2 is preferable since it would set the sub-ACL to 90% of the estimated catch, allowing the scallop actions to potentially make adjustments to open and access area allocations to minimize the risk of the sub-ACL being exceeded.

The No Action alternative provides more flexibility in setting the sub-ACLs when compared to Option 3 and potentially less risks for triggering AMs. Therefore, it should have less impact on scallop revenues and economic benefits compared to Option 3. Whether it has more or less impact than Option 2 depends on how accurate the estimates are. Since under the No Action alternative the sub-ACL is not usually modified for two years, it may have more impacts than Option 2 if the estimates are not accurate.

7.4.2.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified as 90 percent of the Estimated Catch

Groundfish Fishery

Option 2 would use a pre-defined formula to set the scallop fishery sub-ACL from year to year, no longer requiring a Council vote. The scallop sub-ABC will be set at 90% of expected catch and the corresponding sub-ACL will be adjusted to account for uncertainty. Since the scallop sub-ABC will be based on expected catch rather than a fixed proportion of the total ABC, there could be disproportionate allocations of GB yellowtail flounder between the multispecies fishery and the scallop fishery. The scallop fishery could end up with the lion's share of the quota, in the event that the overall ABC declines while expected catch of GB yellowtail by the scallop fishery remains high.

This option represents a slight positive economic impact for the scallop fishery since their allocation will be based on expected catch rather than the ABC. This reduces uncertainty and allows for better business planning. As for the multispecies fishery, this option would have a negative economic impact, because it increases allocation uncertainty and the risk of very low GB yellowtail quota. It is difficult to quantify these impacts because future ABCs and expected catch levels have so much uncertainty.

There could be a management cost savings from Option 2, by minimizing the time spent by regulators setting the scallop sub-ACL from year to year, though it would be minimal.

Scallop Fishery

If the allocation for the YT sub-ACL to the scallop fishery is based on 90% of the "medium" estimate, that would be equivalent to 76.8 mt (90% of 85.3 mt; Table 83) for the preferred alternative (Alternative 2), and higher amounts for other alternatives with the exception for Alternative 4 (49.6 mt = 90% of 55.1 mt; Table 83) in 2013. Because the 90% of estimated catch allocation alternative is the same regardless of the total US ABC, the potential economic impacts are the same for the scallop fishery if the US ABC is 215 mt or 495 mt with this allocation alternative.

The economic impacts of Option 2 are similar to the No Action alternative, with the exception that under Option 1, there is no guarantee that the amount of sub-ACL for the scallop fishery will equal 90% of the estimated catch – it could be below or higher than 90%. The 90% of the estimated yellowtail catch could provide a sufficient amount for the scallop fishery in 2013 and 2014, minimizing the risks of AM triggers. Again, if the actual yellowtail bycatch comes close to the high estimates, the sub-ACL could be exceeded, having a higher risk of triggering AMs, resulting in closure of scallop fishing during certain months according to the schedule shown in Table 85. At overage rates of 56% or less, the areas will be open to fishing part of the year, so fishing effort could be moved to other months, possibly increasing the fishing costs. If the effort was shifted to other seasons when the mean weights are highest, there could be some positive impacts on the long-term revenues, possibly offsetting some of the negative economic effects of the effort shifts.

As a worst case scenario, if the overage is greater than 56%, there would be no access to CAII, the revenues would decline by $16.2 million (present value of revenues), and total economic benefits would decrease by $16.9 million with the preferred alternative (ALT 2, FW 24) in 2014 fishing year (Table 86 and Table 87). The same risk is also valid for Option 1 and Option 3, except that Option 3 combined with an overall yellowtail quota of 1150 mt would greatly reduce such risks even if the yellowtail bycatch by the scallop fishery approached the high estimate. However, as mentioned above, Framework 24 is a one-year action and the next framework may revise the open area DAS and access area trip allocations. Still, these amounts represent the potential loss under the worst case scenario of a total CAII closure in 2014, since without such a AM trigger, the vessels would be given the flexibility to fish in CAII in all months but Aug 15-Nov 15, if the revised schedule in FW24 is approved (if the resource conditions were similar to what is predicted at this point in time).

In short, the 90% allocation rule would reduce the risk of exceeding the sub-ACL, especially when the biomass level of GB YT is relatively low. One advantage of this option is that the amount of sub-ACL would change as new information is developed, while with Option 1, the sub-ACL could remain at the same level for 2 or 3 years. Because Option 3 ignores current conditions and scallop management measures and sets the allocation at a fixed percentage of the ACL, it is potentially more likely to result in negative economic impacts on the scallop fishery when GB YT biomass is relatively low, due to AM triggers, compared to Option 2.

A concern with Option 2 is that it does not allocate the exact amount the scallop fishery can catch, but instead allocates a fixed percentage (90 percent). The estimates of scallop fishery catches of GB yellowtail flounder are uncertain. Uncertainty about changes in scallop and yellowtail flounder biomass, uncertainty about future fishing activity levels spatially and seasonally, and uncertainty about discard rates all affect the estimates. Option 2 does not specify the basis for the calculation. If the calculation is based on the point estimate of the median expected catch, and this estimate is unbiased, then the expectation would be that in some years the scallop fishery will exceed its sub-ACL, triggering AMs, with potentially negative economic impacts on the scallop fishery.

7.4.2.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History *(Preferred Alternative)*

Groundfish Fishery

Option 3, unlike Option 1 and Option 2, uses a fixed percentage of the US ABC to set the sub-ABCs for the multispecies and scallop fisheries. This means that changes in overall ABC for GB yellowtail flounder will be proportionally distributed. This option will remove any uncertainty as to how the sub-ACLs will be set annually, which will allow for improved decision making by fishermen. It could also lower management costs slightly. It is more equitable than Option 2, because it bases the scallop sub-ACL percentage on catch history and removes the possibility of disproportionate allocations between the multispecies and scallop fisheries. It also provides economic incentives to use selective technology in the scallop fishery to minimize the take of GB yellowtail flounder while maximizing scallop harvests. The only caveat to Option 3 is that there is higher risk of an efficiency loss from underutilization, since the sub-ACLs will not incorporate the latest stock and catch information each year and because quota is non-transferable between the fisheries. This in turn could negatively impact the achievement of optimal yield (OY).

Scallop Fishery

Option 3 would establish a fixed percentage of the GB yellowtail flounder ABC that would be allocated to the scallop fishery. The percentage would be defined as 40 percent of the U.S. ABC in FY 2013, and 16 percent in subsequent years (FY 2014). The 40 percent of U.S.ABC is equal to the medium estimate for yellowtail bycatch in the scallop fishery (85.3 mt) under the preferred alternative (assuming the U.S. ABC would equal to 215 mt). As a result, it would reduce the risks of exceeding the yellowtail sub-ACL for the scallop fishery in 2013.

As with Option 1 and 2, there would be risks of exceeding the sub-ACL if the yellowtail bycatch by the scallop fishery turns out to be higher than the medium estimate. For example, if yellowtail bycatch equals the high estimate of 152.8 mt, then the sub-ACL would be exceeded by 67.4 mt with Option 3, or by almost 80% resulting in closure of CAII to scallop fishing year around in 2014 (in 2015 if reliable data does not exist by 2014) according to the AM schedule in

Under the worst case scenario (no 2014 CAII trips), the estimated scallop revenue impact would be $16.2 million in 2014, assuming that this area was allocated the same number of trips if preferred alternative (Alt 2) was implemented in 2014 as well (109 FT limited access trips at 13,000 pounds per trip). Framework 24 is a one year action and the next framework may revise the open area DAS and access area trip allocations. However, these amounts represent the potential loss under the worst case scenario of a total CAII closure in 2014, since without such an AM trigger, the vessels would optimally be given the opportunity to fish in that area (if the resource conditions were similar to what is predicted at this point in time).

If the yellowtail sub-ACL was exceeded by less than 56%, however, CAII would still be open to fishing during some months depending on the overage amount (Table 85). However, shifting landings to the other seasons would reduce the flexibility for vessel owners to choose where and when to fish with a possible increase in fishing costs. On the other hand, shifting effort to other seasons when the meat weights are highest (i.e. May and June) could possibly increase long-term landings and revenues to some extent, offsetting some of the negative effects of the effort shifts.

Option 3 would allocate 16% of the U.S. ABC in 2014. That would equal 34.4 mt or only 27% of the estimated yellowtail catch in FY 2014 (127 mt medium estimate) under the preferred alternative in Framework 24. Such a low sub-ACL amount is very likely to be exceeded and result in closure of CAII in 2015 (or in 2016 if reliable data does not exist by the end of 2014). The exact level of revenue loss cannot be quantified for 2015 at this time. However, there is no question that an allocation based on the 16% of the U.S ABC would be quite restrictive relative to the estimated yellowtail bycatch in 2014 and would have negative economic impacts on the scallop revenues and benefits from the scallop fishery, especially if the optimal allocations included access trips to CAII in 2015. Since scallops specifications have not been set yet for FY2014, it is possible that the level of scallop effort in CAII could be lower reducing the potential for triggering GB YT AMs. That could have potentially negative impacts on the scallop fishery, compared to allocating scallop fishing effort in each access area based on available scallop resource levels.

When compared to the other options, the risk of exceeding the yellowtail sub-ACL by the scallop fishery would be slightly smaller than Option 2 in 2013 because this option provides a higher amount (100 percent versus 90 percent of the estimated yellowtail bycatch in 2013), but the risks could be higher than both Option 1 and 2 in future years, especially if GB YT biomass remains at historically low levels. Under this Option 3, there is less consideration of current conditions and fishing activity when specifying the allocation than is the case with either the No Action alternative or Option 2. As a result, there is greater risk that the allocation would not reflect the expected catch of GB yellowtail flounder by the scallop fishery, while Option 1 would take into account the current conditions and Option 2 would allocate 90 percent of the estimated yellowtail bycatch to the scallop fishery. An advantage of Option 3 over the others is that the Council does not need to revisit this controversial allocation decision every year. By setting the allocation at a fixed percentage, the scallop management plan can develop future allocations within that constraint. As GB YT rebuilds, this fixed percentage would hopefully not be as limiting; therefore, reducing potential impacts from AMs being triggered.

7.4.2.4 Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

7.4.2.4.1 Option 1: No Action

Groundfish Fishery

Under Option 1, there would be no new GB yellowtail flounder sub-ACL for small-mesh fisheries. Small-mesh fisheries would continue to operate under the umbrella of other sub-components to the multispecies fishery. Since this option maintains the status quo, it does not have any new economic impact.

7.4.2.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder *(Preferred Alternative)*

Groundfish Fishery

Option 2 would assign a fixed percentage of the US GB yellowtail flounder ABC to small-mesh fisheries based on their catch history. This would reduce allocation uncertainty for small-mesh fisheries, allowing for better decision making, however it would also subject small-mesh fisheries to an AM in the event of overages. The magnitude of these impacts would ultimately depend on the yearly sub-ACLs, probability of overages, and specifics of the currently undefined small-mesh AM for GB yellowtail flounder.

The multispecies fishery may experience a slight positive economic impact through a reduction in the risk of overages from the other sub-components segment of the fishery and the associated cost of the multispecies AM. Since the small-mesh sub-ACL would be subtracted from the other sub-components allocation, it does not represent any transfer of wealth from the multispecies fishery to the small-mesh fishery.

By distributing accountability for overages across the multispecies and small-mesh fisheries, Option 2 is expected to reduce the chance of an overage to the overall ACL. This would help prevent overfishing, which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land GB yellowtail flounder.

7.4.3 Commercial and Recreational Fishery Measures

7.4.3.1 Management Measures for the Recreational Fishery

7.4.3.1.1 Option 1: No Action

Under Option 1, there would be no changes made to the recreational fishery AMs. Measures to control catch levels will only be adjusted after catch has exceeded the recreational sub-ACL. Amendment 16 specifies that the three-year average catch will be compared to the three-year average ACL when evaluating overages and AMs will go into place the following fishing year. As currently written in Amendment 16, the use of a three-year average is scheduled to begin in FY 2013. There are several existing economic costs associated with Option 1. There is a moderately high risk of overfishing, resulting in a negative stock impact to both the recreational and commercial industries. There is also a moderately high risk of under-fishing which has a negative impact on the social and economic aspects of OY. Under-fishing could have a potential positive stock effect offsetting some of the associated negative economic impacts.

7.4.3.1.2 Option 2: Revised Accountability Measures for the Recreational Fishery *(Preferred Alternative)*

Option 2 would allow AMs to be adjusted based on predicted changes to sub-ACLs and expected recreational take and to the extent possible, they will go into effect before the start of the fishing year. By allowing AMs to be used proactively, there are a number of economic benefits. The risk of overfishing will be minimized, which will have a positive effect on the sustainability of fish stocks and future landings for both commercial and recreational fishermen. The risk of under-fishing will also be minimized, which will have a positive impact on the social and economic impacts of OY. Recreational businesses that rely on certain stocks may have difficulty making business decisions, since fishery measures could become abruptly restrictive. This may increase operating costs. This option would also increase management costs, since regulation will become more interactive, requiring more data gathering and analysis, as well as Council input, however, the benefits are expected to outweigh these costs.

7.4.3.2 Groundfish Monitoring Program Revisions

7.4.3.2.1 Option 1: No Action

The selection of Option 1 would uphold the groundfish monitoring requirements set forth in Amendment 16 and subsequent framework actions. As such, from FY 2013 on, the multispecies industry would be completely responsible for funding both the at-sea monitoring (ASM) and dockside monitoring (DSM) programs described in Amendment 16 and Framework 45. This would have a substantial economic impact on sector vessels (which account for more than 98% of the commercial groundfish fishery) by increasing their operating costs. As shown in the 2011 Final Report on the Performance of the Northeast Multispecies Fishery, had ASM/DSM costs been paid for by sector vessels in FY 2011, it would have had a large impact on aggregate net revenue as well as average net revenue per vessel. ASM/DSM costs in FY

2011 were estimated at $5.2 million and had the industry been responsible for those costs, it would have lowered aggregate vessel owners' shares of net revenue by a range of 2 to 12 percent and average net revenue per vessel by a range of 1 to 12 percent. The highest percent reductions would have been focused on vessels 30 feet to 50 feet in length. The largest reduction in aggregate owners' shares by home port was expected to occur in New Hampshire (Murphy et al., 2012).

It is difficult to estimate the magnitude of ASM/DSM costs in future years because they are dependent on coverage rates and labor costs, but it is clear that if they are funded by the industry, they will have a substantial negative economic impact to sector vessels. It is likely that vessels operating close to the margin would no longer be able to fish at a profit under Option 1 and would be forced to lease their quota or exit the industry. This attrition would negatively impact income levels and reduce earning opportunities for crew.

7.4.3.2.2 Option 2: Monitoring Program Goals and Objectives *(Preferred Alternative)*

Option 2 is an administrative measure that would expand upon the goals and objectives of monitoring programs laid out in Amendment 16. In and of itself, the economic impacts of this option are no different than those listed for Option 1. Depending on how these goals and objectives are incorporated into the design of monitoring programs, there could be associated benefits and costs, though it is unclear what the benefits and costs would be. In general, it seems that improving monitoring in terms of better documentation, data quality, and safety will have long term benefits on the ability of regulators to effectively manage discards and thus set appropriate ACLs. In the short term, implementation of these goals could make the cost of monitoring programs increase. This depends how successful Goal 2, aimed at reducing costs of monitoring, is in conjunction with the other goals.

7.4.3.2.3 Option 3: ASM Coverage Levels

Sub-Option A *(Preferred Alternative)*
Sub-option A1 requires ASM coverage equal to the coefficient of variation (CV) in the Standardized Bycatch Reporting Methodology at the stock level. Option A2 requires coverage equal to the CV at the stock and sector levels. The former would maintain current coverage levels and A2 would require higher levels of coverage. Option A2 could have long term positive economic impacts if it leads to more accurate discard rates and more effective control of discards. If discard rates are too high, multispecies vessels are expending more quota than they need to harvest legal fish and if they are too low, then ACLs are being improperly set, resulting in overfishing. Either way, improving the quality of discard estimates and the effectiveness of monitoring programs on controlling discards will have a positive long term impact. In the short term, Option A2 will result in higher operating costs to the industry, which will negatively impact net revenues and profitability.

Sub-Option B *(Preferred Alternative)*
This sub-option removes any ASM cost burden from the industry for FY 2013. It will set ASM coverage rates at a level that can be funded by NMFS. In FY 2014, absent any action, the industry would then be responsible for the portion of ASM costs not covered by NMFS. Sub-option B would have a positive short-term economic impact on the multispecies industry by reducing operating costs and thus increasing profitability in FY 2013. Since this option only prolongs the adoption of industry funded ASM, in the

long-term it will have no economic impact beyond what is described in Option 1. In FY 2013, there is also an opportunity cost to the government with respect to the funds used to pay for ASM that does not exist under Option 1.

Sub-Option C *(Preferred Alternative)*
Under Sub-option C1, upon an annual determination by NMFS of sector ASM coverage rates, NMFS would specify some lower coverage rate for sector trips under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear. This would reduce the cost of ASM to the industry in future years and would be particularly beneficial to the vessels making the trips described in this sub-option as they would have a lower probability of being selected for ASM on each trip. Sub-option C2 would remove all ASM coverage from these vessels representing even greater cost reduction. With either Sub-Option C1 or C2, the reduction in coverage rates on the monkfish trips in the SNE Broad Stock Area using ELM gillnet gear could result in less accurate estimates of discards causing sector vessels to either burn unnecessary quota or permitting overfishing. Depending on how many trips of this type are taken and what the actual discard rates are, the economic impacts identified could be larger or smaller. Since these trips typically land only small amounts of groundfish, it is likely that the benefits of redistributing ASM funds to other trips will outweigh the costs.

7.4.3.2.4 Option 4: Industry At-Sea Monitoring Cost Responsibility

Option 4 would modify the ASM cost responsibility of the industry. The industry would only be responsible for funding the direct costs associated with having the at-sea monitor on the vessel (daily salary of at-sea monitor). NMFS would pay for all other programmatic costs associated with ASM. Option 4 has a positive economic impact to the industry over Option 1, since it minimizes the overall industry ASM expenditures. These cost savings would translate into higher net revenues than under Option 1. Under Option 4, sector vessels would, however, still be negatively impacted by the high at-sea costs of ASM. The per-day at-sea cost for a monitor in 2010 was approximately $700 and this represents over 75% of the total daily per-day cost of the ASM program including infrastructure. There is also an opportunity cost to the federal government under Option 4 that does not exist under Option 1, in which the ASM program would be fully paid for by the industry starting in FY 2013.

7.4.3.2.5 Dockside Monitoring Requirements

7.4.3.2.5.1 Option 1: No Action

Option 1 would revert dockside monitoring (DSM) levels in FY 2013 to those specified in Amendment 16 and modified in FW 45. This means that the industry will be responsible for funding the DSM program starting in FY 2013. This option is expected to have a negative economic impact on the industry by increasing operating costs. The accuracy of landings records has an effect on the ability of the regulators to manage catch levels but since landings are also reported by dealers, the economic gain to having DSM is likely minimal.

7.4.3.2.5.2 Option 2: Elimination of Dockside Monitoring Requirement

Option 2 removes the DSM requirement entirely and thus would reduce the monitoring cost burden on the industry which will increase net revenues over Option 1. There are potential economic consequences resulting from this option if the accuracy of landings data declines substantially or unreported landings increase making it harder to manage catch levels. Since dealers report all of the landings electronically and since ASM will remain in place, it is not likely to have a huge impact.

7.4.3.3 Commercial Fishery Minimum Size Restrictions

7.4.3.3.1 Option 1: No Action

Selection of this option would maintain the status quo. There are no new economic impacts expected, since size restrictions will not change. Under this option, all undersized fish that are caught become regulatory discards.

7.4.3.3.2 Option 2: Changes to Minimum Size Limits *(Preferred Alternative)*

All fish caught by sector vessels are counted against sector quota whether or not they are landed or discarded, no matter what the minimum size limits are. Under Option 2, as opposed to the No Action alternative, changing the minimum size limit will allow more of these fish to have economic value rather than be wasted, which will increase trip revenues and help to achieve the economic benefits of OY. Potential price effects resulting from increased supply could offset some of the gain in revenue, but since the market is segmented into categories based on the size and quality of fish, it is not expected to outweigh the benefits. Fishermen will also have to handle and sell the additional fish, but it seems unlikely that the marginal cost would outweigh the marginal revenue.

The best way to quantify the impacts of this option on revenue would be to use observer data to get proportional discards by size and then determine what percentage of the discards for each species are above the new species-specific size restrictions. This ratio could then be multiplied by the estimated discards from the Quota Change Model to predict the overall pounds per species that would be retained under this option. Prices for the nearest market category could be used to get an upper bound estimate of revenue. Due to time constraints, this analysis is not currently feasible.

Option 2 is not expected to have a substantial economic impact on common pool vessels because they are still beholden to trip limits. This means that common pool vessels are not required to land all undersized fish. As such, the incentive for high-grading remains because larger fish tend to bring higher prices.

Since most discards are assumed dead when setting and monitoring catch levels (a discard mortality rate is applied to some winter flounder stocks and may be applied in the future to cod), there is no direct biological impact. The potential negative biological and economic impacts result from possible shifts in fishing behavior. If fishermen begin purposefully targeting smaller fish as a result of the new size restrictions, then it is possible that the stock MSYs could be harmed by reducing the number of fish that reach maturity and are able to spawn. This in turn would reduce future harvests and revenues. Under this option however, sectors would have to request exemptions to use different mesh sizes and biological impacts would be assessed on a case by case basis before they are approved.

7.4.3.3.3 Option 3: Full Retention *(Preferred Alternative)*

Option 3 would remove size restrictions for allocated species from the commercial multispecies fishery. Under this option, fishermen would be required to land all allocated species regardless of size or quality. This is expected to have a substantial economic impact in terms of increasing revenues. Table 88 provides predicted changes in revenue for FY 2013 under this option using estimated discards from the Quota Change Model. The upper bound revenues assume the smallest current market category mean price for each discarded species and the lower bound revenues assume a per pound price consistent with the bait market (average herring prices). The marginal cost of handling the additional landings is unknown, but is assumed to be lower than the revenue.

Table 88 – Estimated potential short-term revenues under full retention option

		Estimated gross revenues from retention	
	Discards under No Action (lbs)	**Upper bound**	**Lower bound**
Scenario 1	2,188,534	$ 2,450,055	$ 459,592
Scenario 2	2,244,717	$ 2,526,216	$ 471,391
Scenario 3	2,360,559	$ 2,683,470	$ 495,717
Scenario 4	2,657,858	$ 3,047,175	$ 558,150

Option 3, much like Option 2, is not expected to have a substantial economic impact on common pool vessels because they are still beholden to trip limits. This means that common pool vessels are not required to land all undersized fish. As such, the incentive for high-grading remains because larger fish tend to bring higher prices.

The adoption of Option 3 would create the potential to use electronic discard monitoring in lieu of ASM. This is a potential cost saving to either the federal government or the industry, depending on who is responsible for funding a monitoring program.

As with Option 2, there are likely no short-term biological impacts expected, as discards are accounted for via at-sea monitoring and factored in to the setting of catch levels. However, if you remove size restrictions it could change targeting behavior resulting in potential medium and long-term negative impacts due to lower MSY values and lower yield per recruit. Gear restrictions including minimum mesh size may help to prevent substantial shifts in the size selection of the fleet.

While it is sometimes argued that removing minimum size regulations would just convert discards to landings, it is possible that the selectivity pattern may change for some or all species. This would depend, in part, on whether fishermen can increase profits by targeting smaller fish. Whether this will occur depends on several factors, including whether there is a price differential for a species that is based on size, whether it is easy to target smaller fish, and the relative abundance of different size fish. If fishermen can catch smaller fish more quickly and thus reduce operating costs, then a change in selectivity is more likely.

The potential for changes in selectivity can be inferred from the fact that for some stocks, fishermen targeted smaller fish in the recent past. For example, the minimum sizes in the late 1980's were smaller than they are now for most groundfish stocks. This is not conclusive, however, since the regulatory system was very different. The fishery was open access and there were no firm limits on effort or landings.

If the price difference between large and small fish is large, then targeting small fish will only be profitable if the increased catch rates reduce operating costs sufficiently to outweigh the premium for larger fish. If the difference is small or non-existent it is more likely that small fish will be targeted since generally they are more abundant. Dealer prices from 2011 were examined for seven groundfish species. Prices are only available for fish that presumably met minimum size requirements; it is unknown if these prices reflect the price that may be received for fish smaller than the current minimum sizes.

Each documented sale to a dealer was treated as a price observation, and box plots were created for each species by reported market category (Figure 149). Cod, haddock, plaice, witch flounder and white hake generally show increasing price per pound as size increases. There are some exceptions, however – for example, market and scrod haddock had similar prices in 2011, whale cod prices were generally lower than large cod, and redfish prices were similar for all market sizes except large. Yellowtail flounder prices were generally similar for all market categories. Winter flounder prices were similar at all categories with the exception of lemon sole. Halibut prices were similar for all market categories.

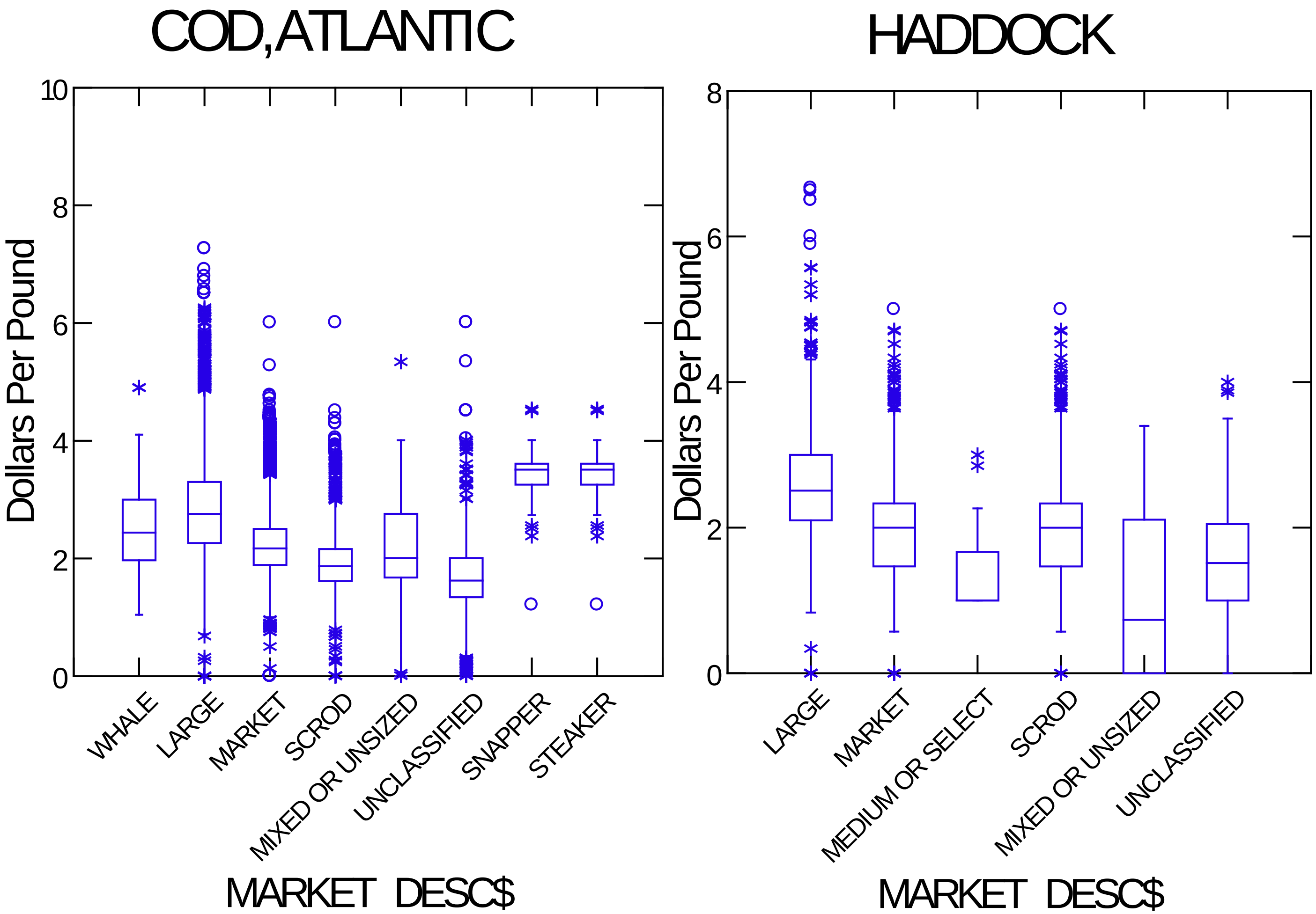
The ability to target smaller fish depends on a number of factors – relative abundance, spatial and temporal distribution of different sizes, and fishing practices. Otter trawls can potentially change the number of small fish they catch simply by changing from diamond to square mesh. While there are numerous factors that affect selectivity, including time and area fished; gear type is easily observed. Observed trawl trips (NEGEAR =050) for 2010 and 2011 (NEFOP) were queried to determine the length-frequency of species catch with diamond and square mesh codend (mesh size 5.5 inches or greater). As can be seen in the accompanying plots (Figure 150), changing the type of mesh towed can change the size of fish caught for cod, pollock, yellowtail flounder, and winter flounder. It appears to do little to affect the size of haddock, witch flounder and plaice that are caught.

Based on these analyses, it would appear more probable that eliminating the minimum size could lead to a change in selectivity for yellowtail flounder and winter flounder than for other stocks. There is little price differential between the current sizes landed and simply changing the type of cod-end used can modify the size of fish caught. A change may be less likely to occur for cod because of the price differential between large and small fish.

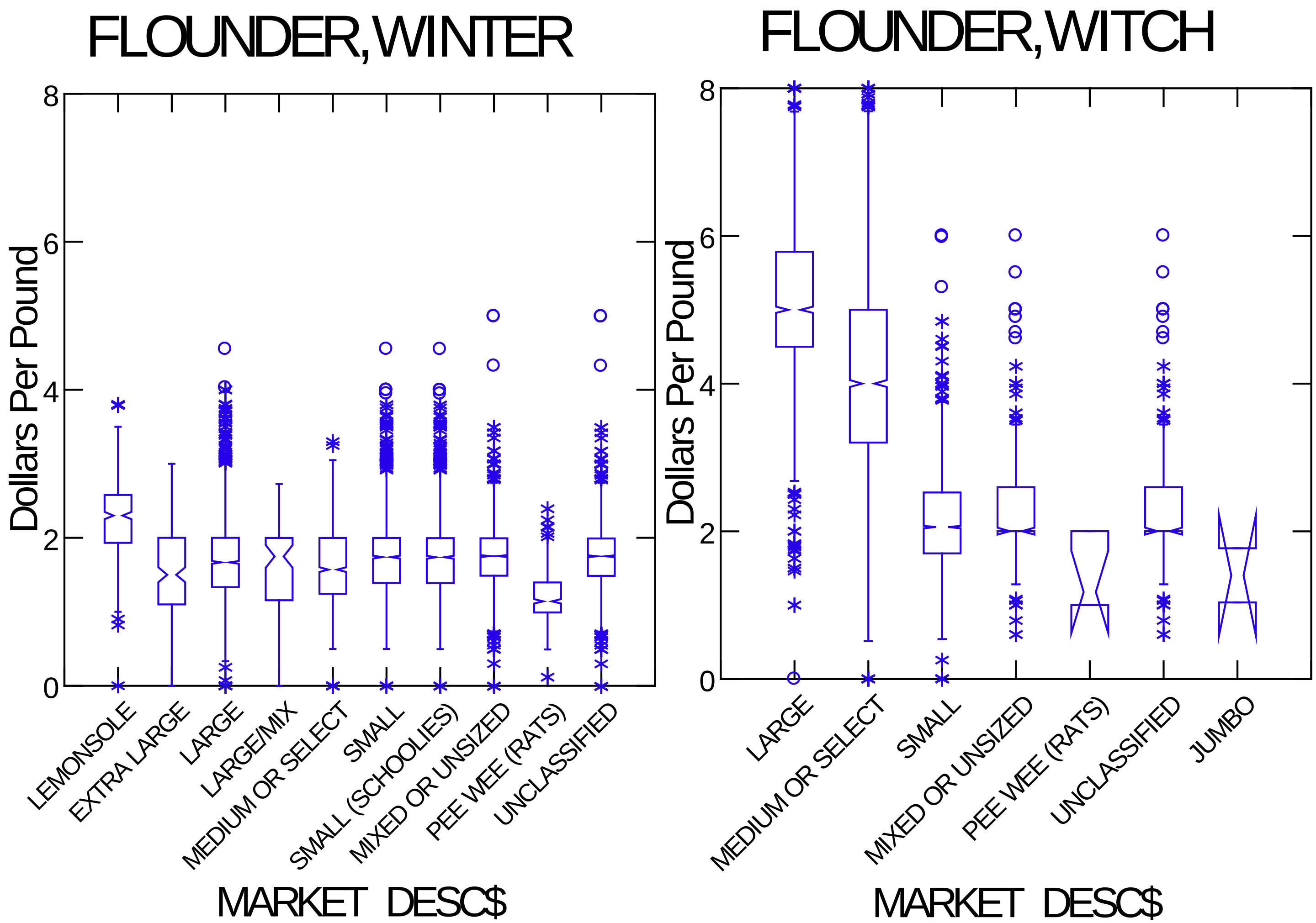
Whether a change in mesh would lead to a shift in fishery selectivity depends what mesh is currently used. As shown in Figure 151, observed trawl tows (NEGEAR=050) retaining groundfish use diamond mesh more often than square mesh. In the GOM and GB there appears to have been a shift to more frequent use of diamond mesh on observed tows in 2006. Assuming that the mesh used on observed tows reflects that used on unobserved tows, roughly 30 percent of tows could be shifted to diamond mesh.

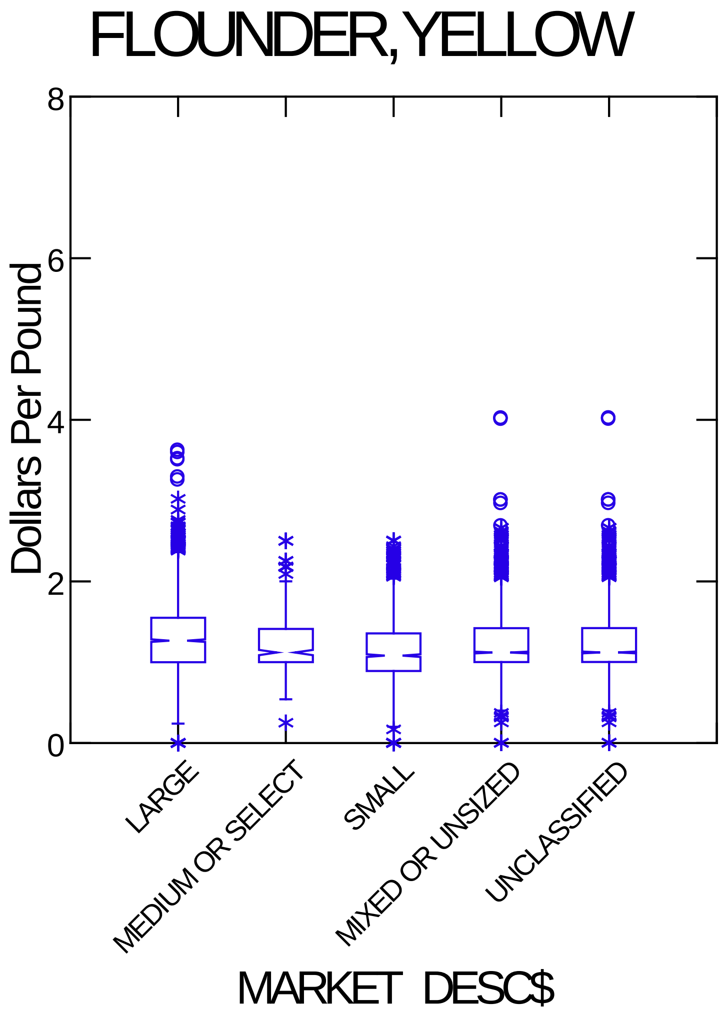
Removing minimum size limits could result in increased targeting of smaller fish for some groundfish species. Relatively minor changes in fishing behavior – such as using a particular mesh configuration – can lead to this result.

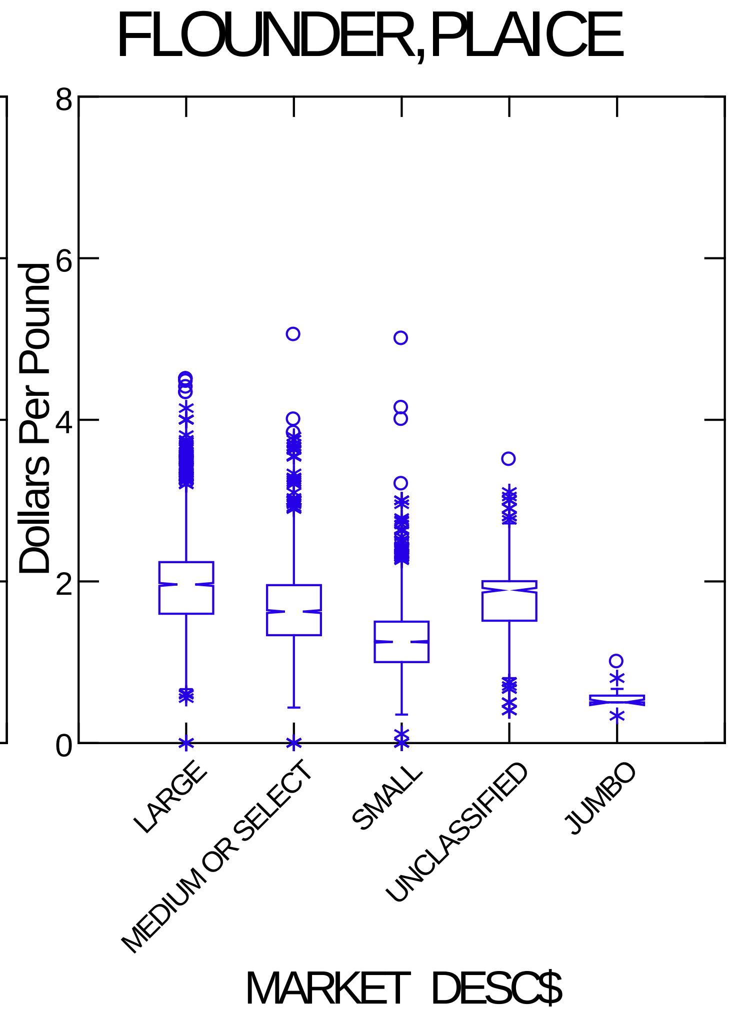
Figure 149 - Average price by market category for key groundfish stocks (Source: NMFS dealer data,

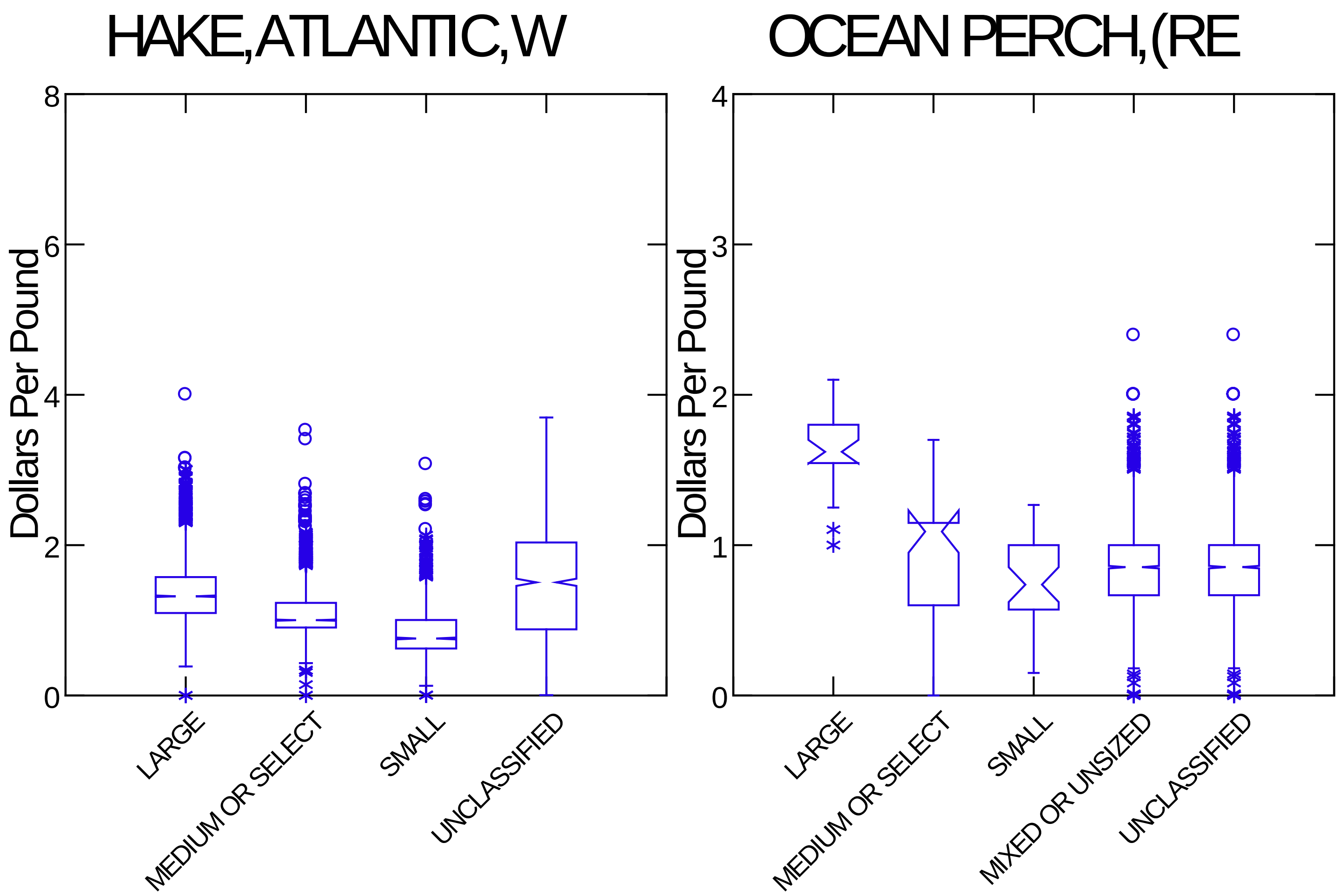


2011)


FLOUNDER,WINTER
Dollars Per Pound
0
2
4
6
8
LEMONSOLE
EXTRA LARGE
LARGE
LARGE/MIX
MEDIUM OR SELECT
SMALL
SMALL (SCHOOLIES)
MIXED OR UNSIZED
PEE WEE (RATS)
UNCLASSIFIED
MARKET DESC$
FLOUNDER,WITCH
Dollars Per Pound
0
2
4
6
8
LARGE
MEDIUM OR SELECT
SMALL
MIXED OR UNSIZED
PEE WEE (RATS)
UNCLASSIFIED
JUMBO
MARKET DESC$


FLOUNDER,YELLOW
Dollars Per Pound
0
2
4
6
8
LARGE
MEDIUM OR SELECT
SMALL
MIXED OR UNSIZED
UNCLASSIFIED
MARKET DESC$


FLOUNDER,PLAICE
Dollars Per Pound
0
2
4
6
8
LARGE
MEDIUM OR SELECT
SMALL
UNCLASSIFIED
JUMBO
MARKET DESC$


HAKE,ATLANTIC,W
Dollars Per Pound
8
6
4
2
0
LARGE
MEDIUM OR SELECT
SMALL
UNCLASSIFIED
MARKET DESC$
OCEAN PERCH,(RE
Dollars Per Pound
4
3
2
1
0
LARGE
MEDIUM OR SELECT
SMALL
MIXED OR UNSIZED
UNCLASSIFIED
MARKET DESC$

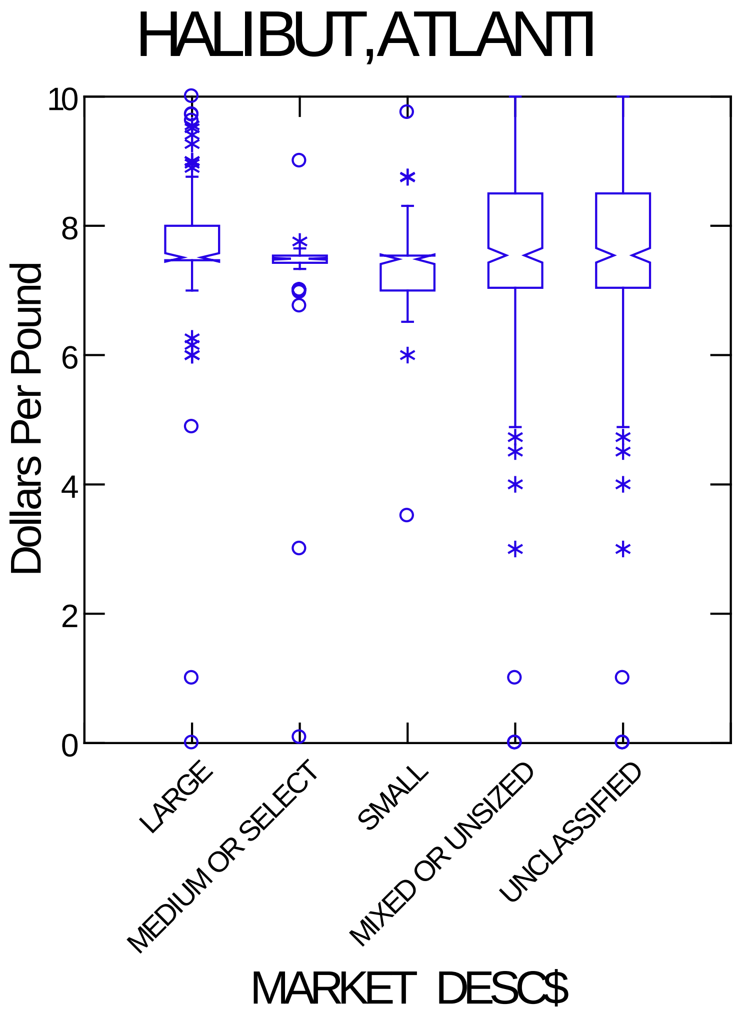
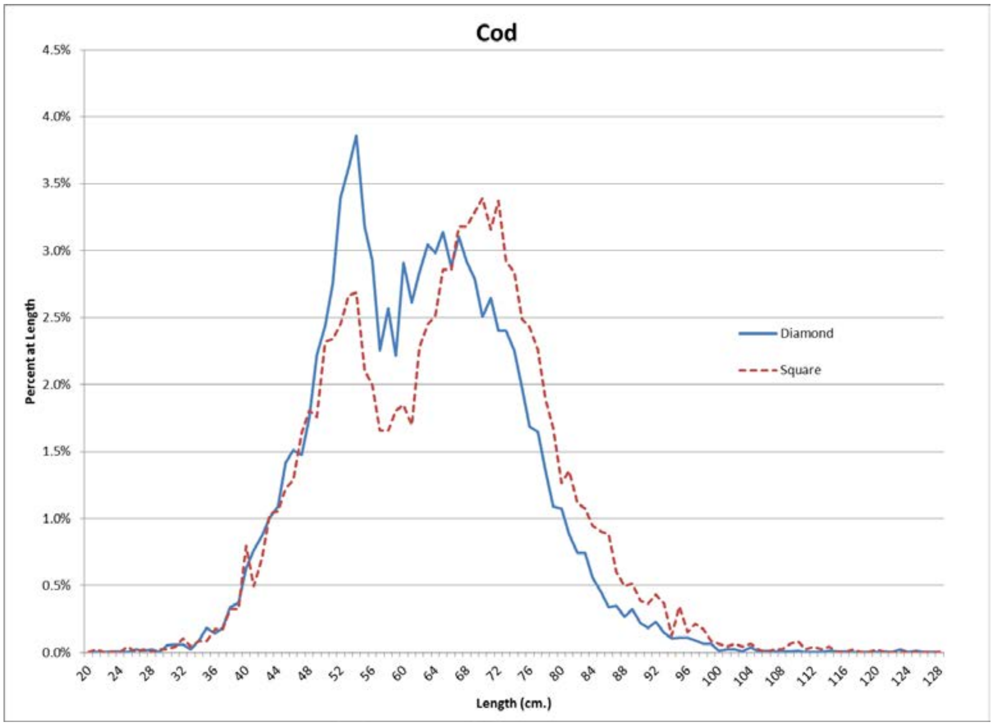
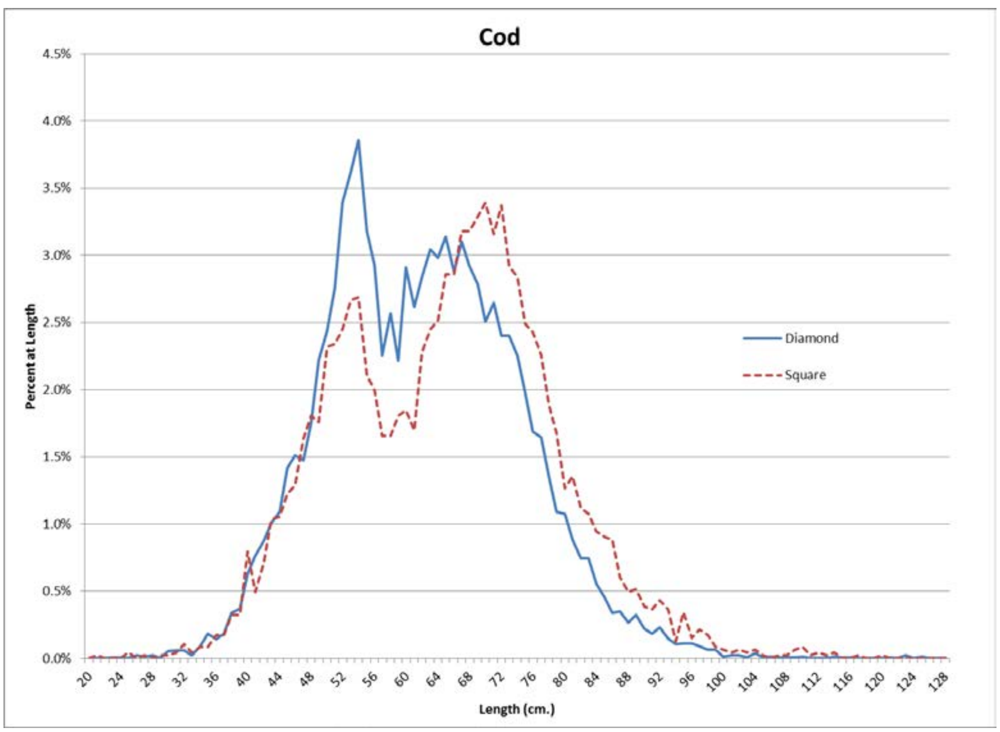
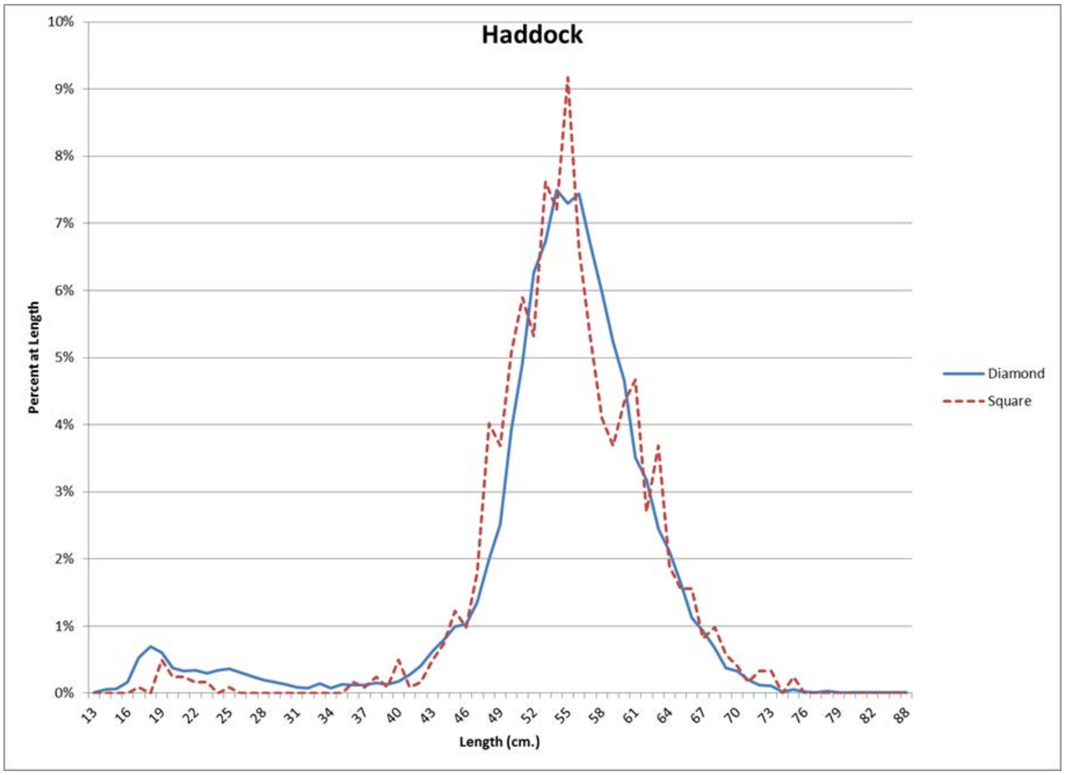
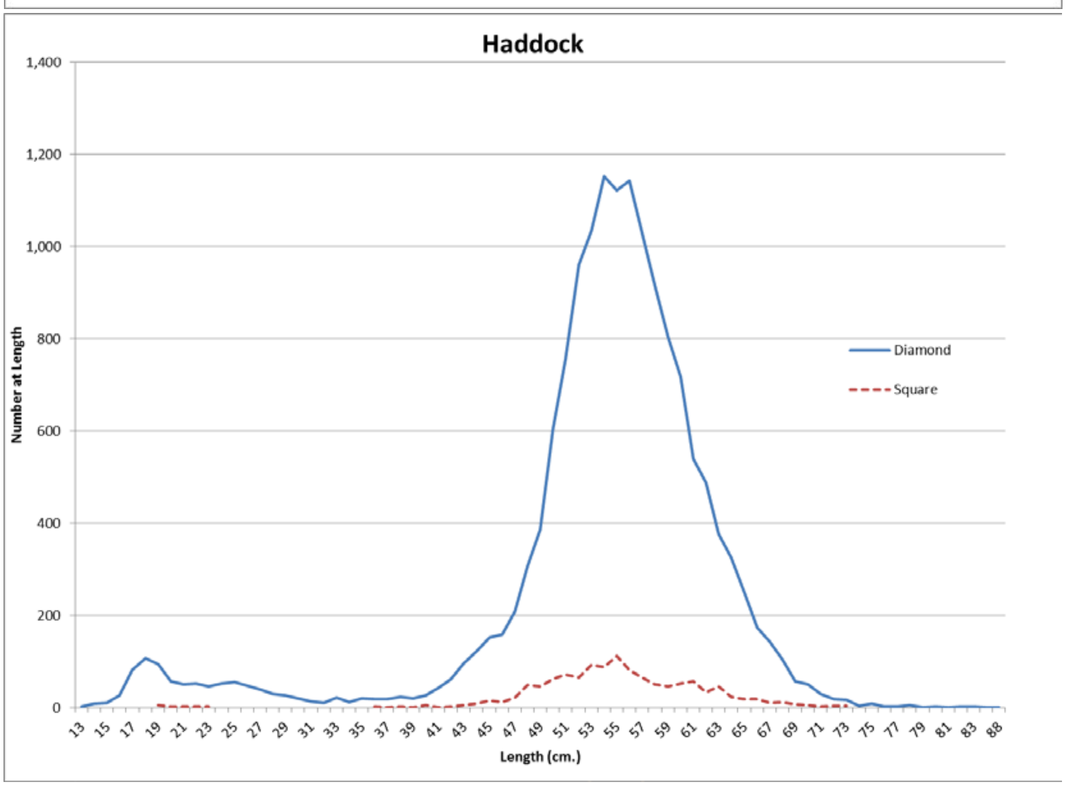

HALIBUT,ATLANTI
Dollars Per Pound
10
8
6
4
2
0
LARGE
MEDIUM OR SELECT
SMALL
MIXED OR UNSIZED
UNCLASSIFIED
MARKET DESC$

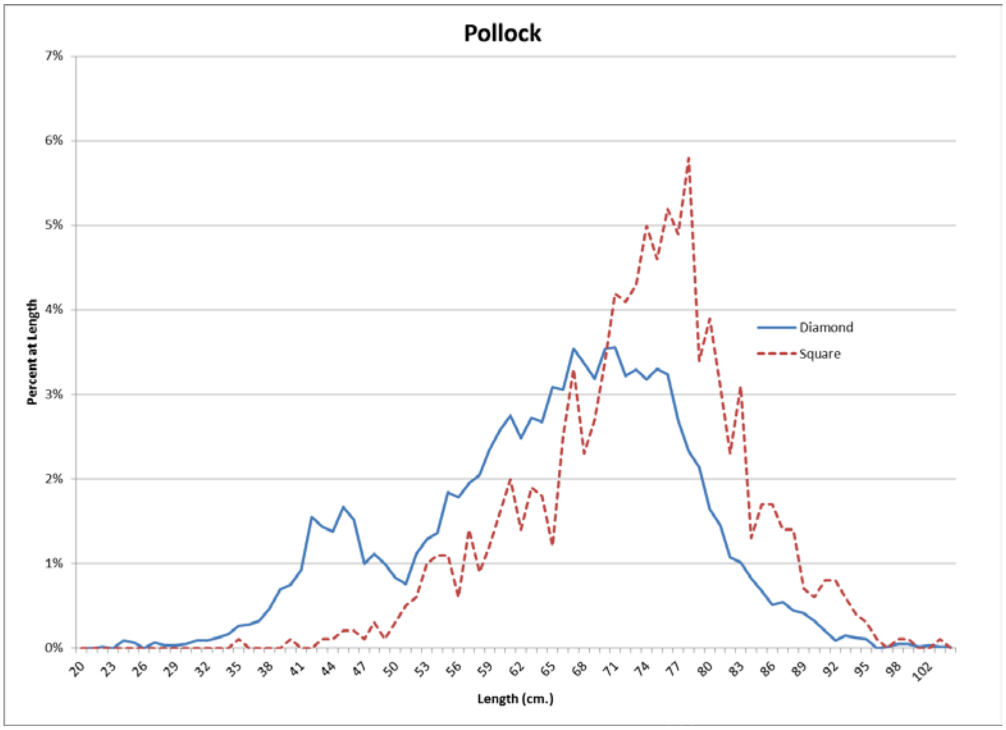
Figure 150 – Length-frequency of key groundfish species with different trawl mesh configurations

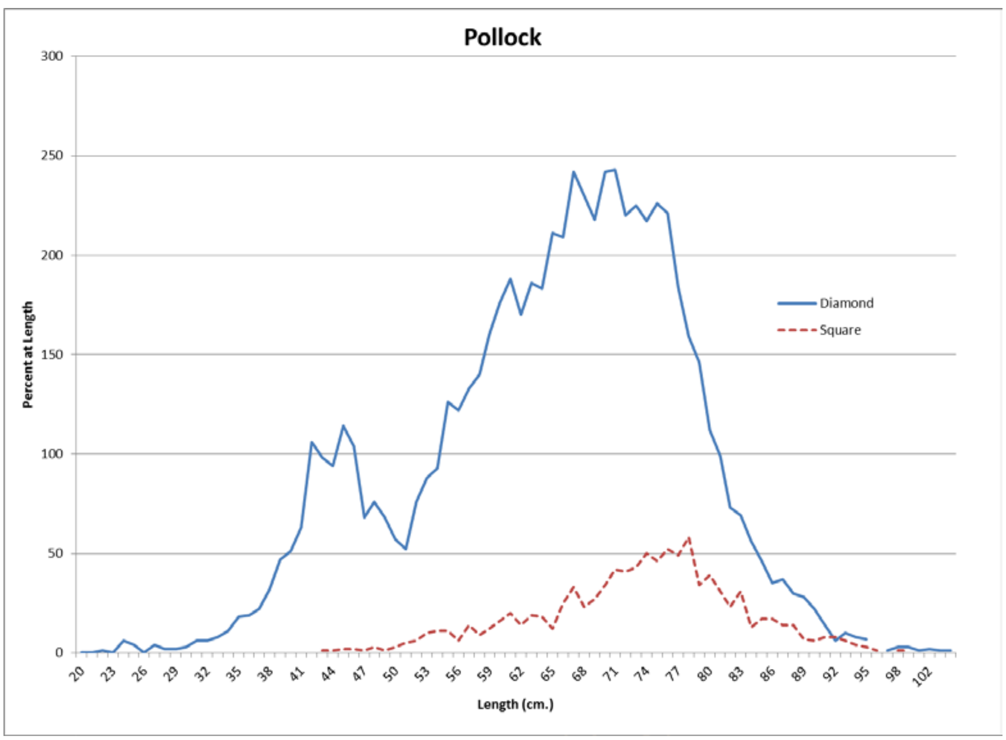


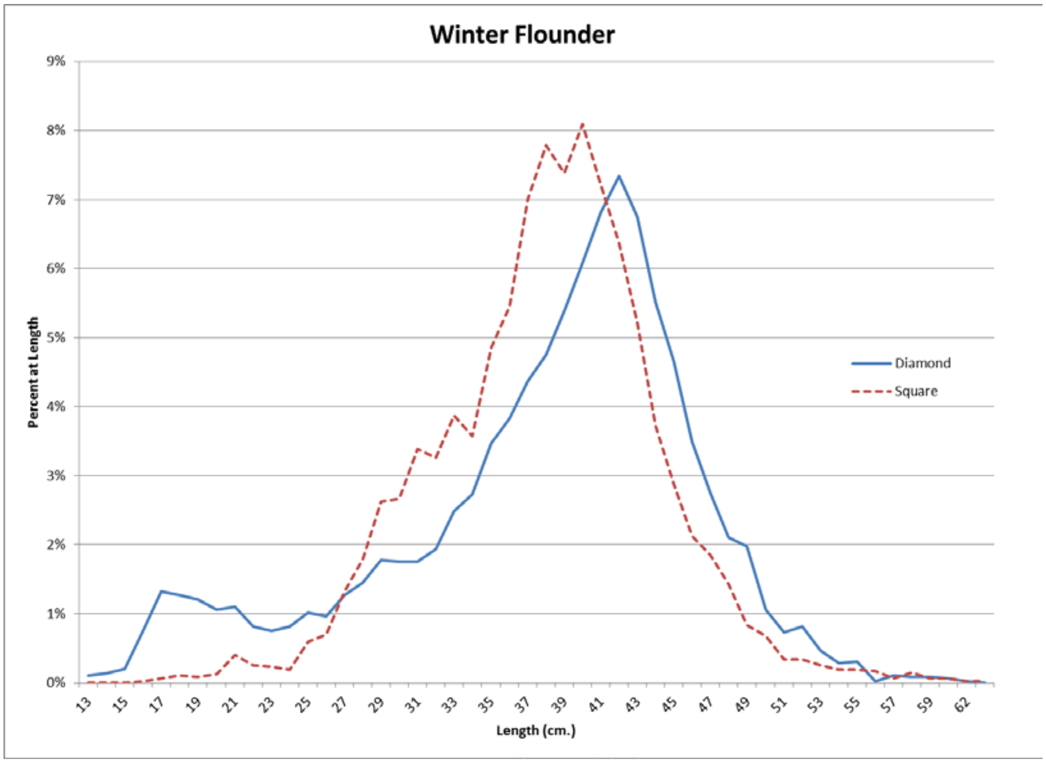


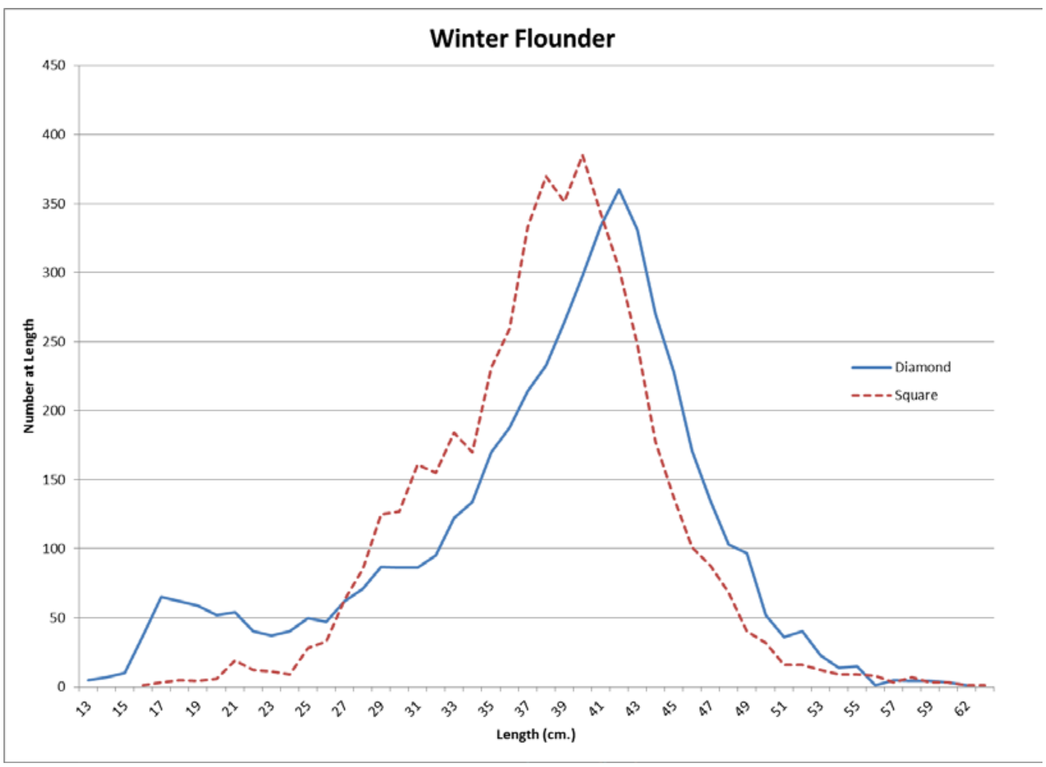

Haddock
Percent at Length
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Length (cm.)
Diamond
Square

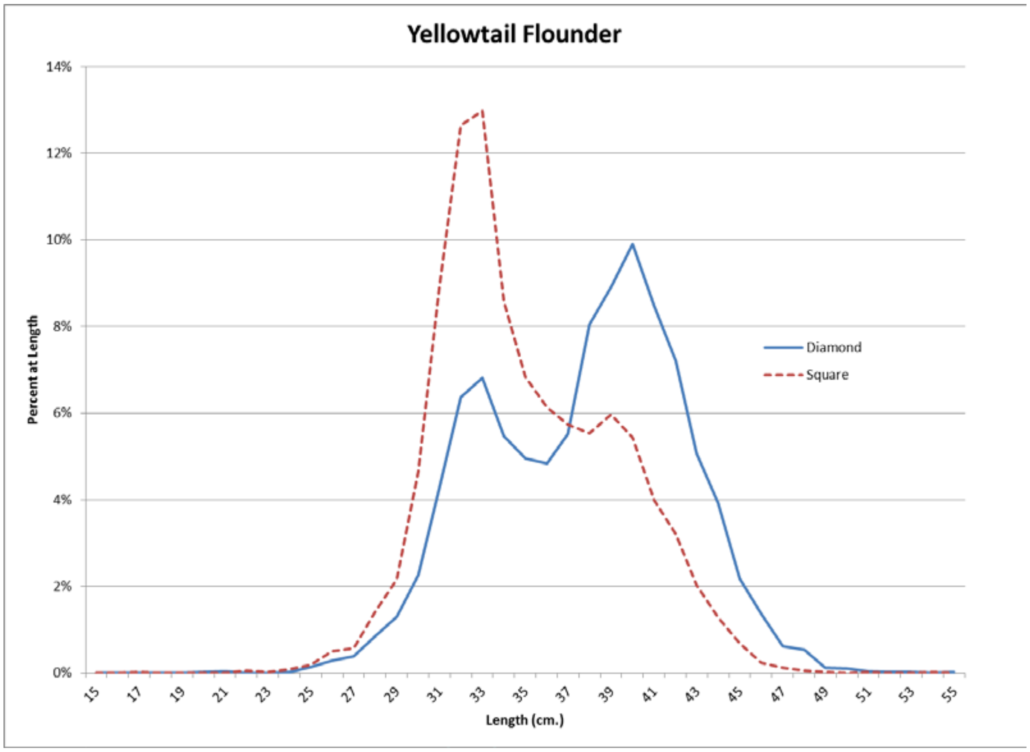

Haddock
Number at Length
1,400
1,200
1,000
800
600
400
200
0
Length (cm.)
Diamond
Square

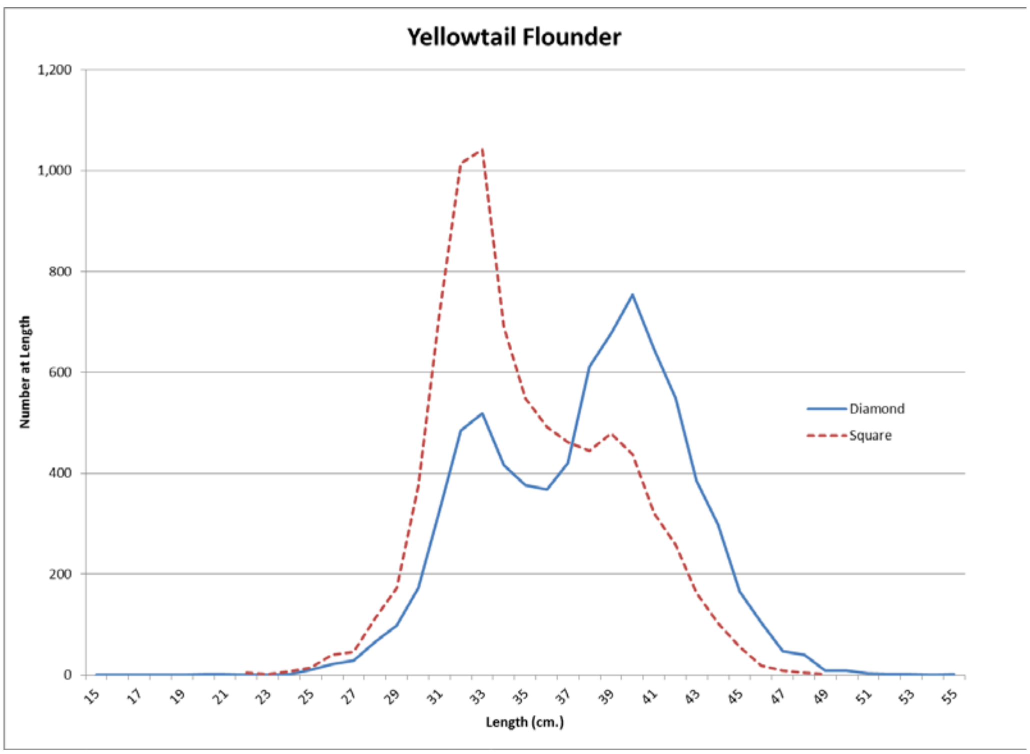

Pollock
7%
6%
5%
4%
3%
2%
1%
0%
Percent at Length
Diamond
Square
20
23
26
29
32
35
38
41
44
47
50
53
56
59
62
65
68
71
74
77
80
83
86
89
92
95
98
102
Length (cm.)

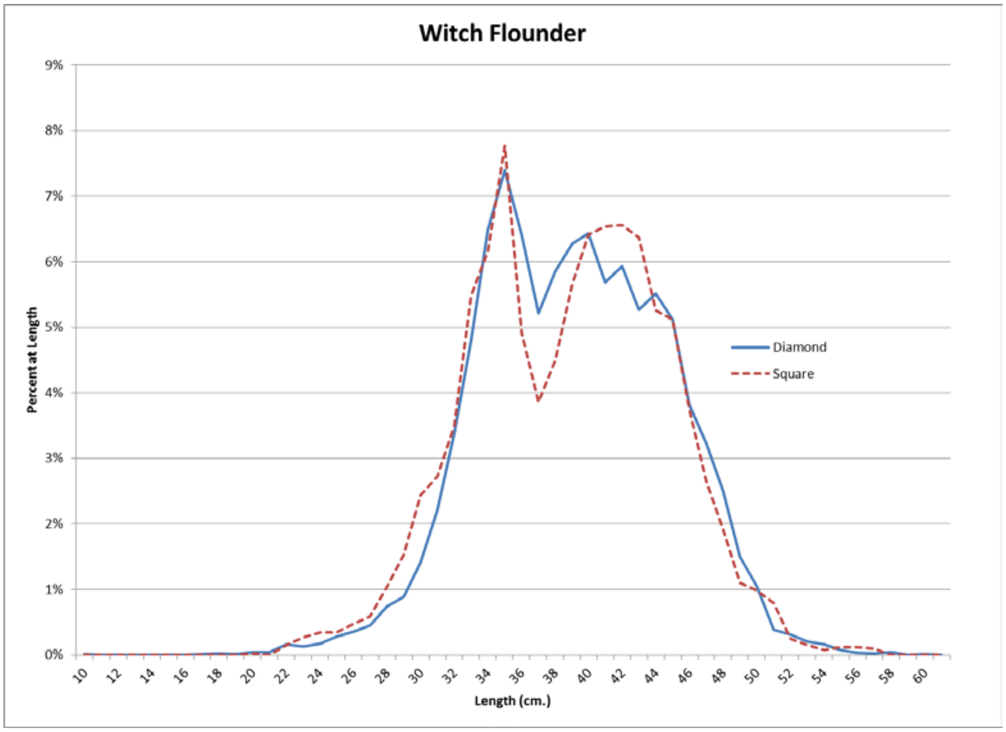

Pollock
300
250
200
150
100
50
0
Percent at Length
Diamond
Square
20
23
26
29
32
35
38
41
44
47
50
53
56
59
62
65
68
71
74
77
80
83
86
89
92
95
98
102
Length (cm.)

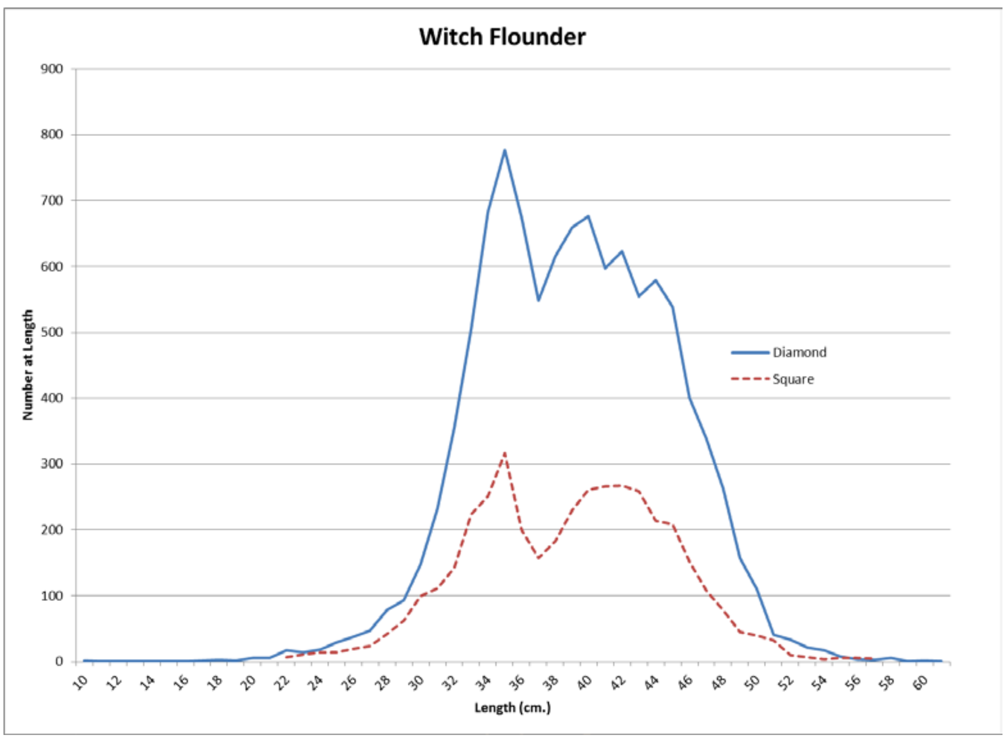

Winter Flounder
Percent at Length
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 62
Length (cm.)
Diamond
Square

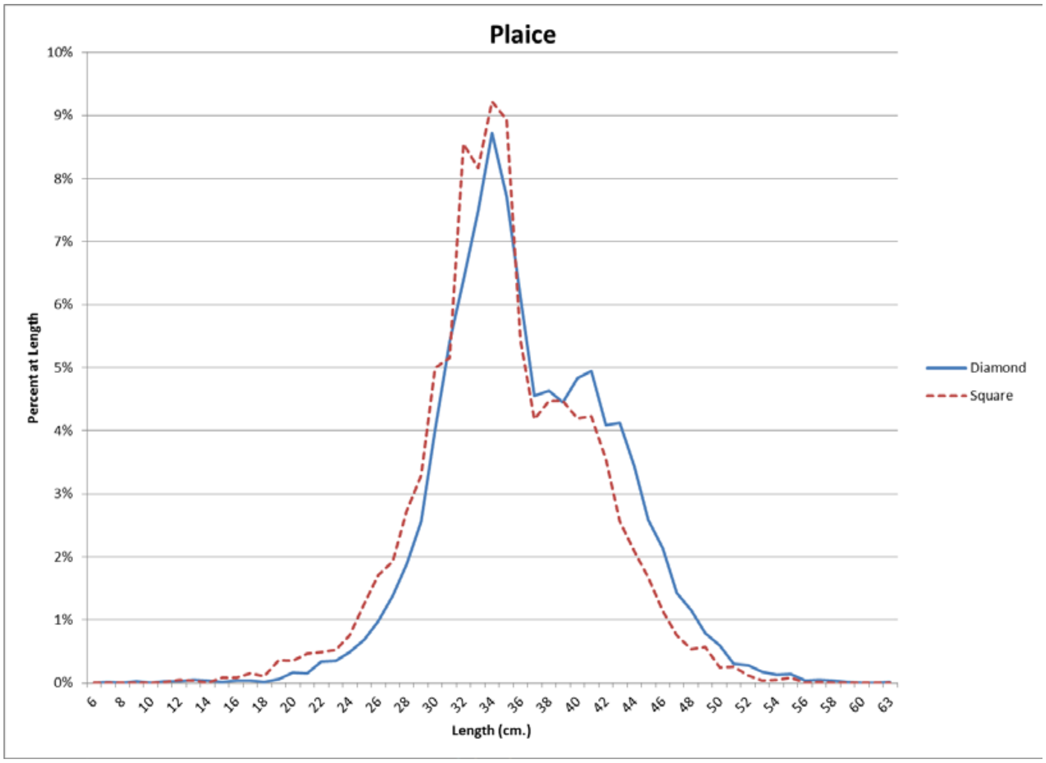

Winter Flounder
Number at Length
450
400
350
300
250
200
150
100
50
0
13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 62
Length (cm.)
Diamond
Square


Yellowtail Flounder
Percent at Length
14%
12%
10%
8%
6%
4%
2%
0%
15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55
Length (cm.)
Diamond
Square


Yellowtail Flounder
Number at Length
1,200
1,000
800
600
400
200
0
15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55
Length (cm.)
Diamond
Square


Witch Flounder
Percent at Length
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
Length (cm.)
Diamond
Square


Witch Flounder
Number at Length
900
800
700
600
500
400
300
200
100
0
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
Length (cm.)
Diamond
Square


Plaice
Percent at Length
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Length (cm.)
Diamond
Square

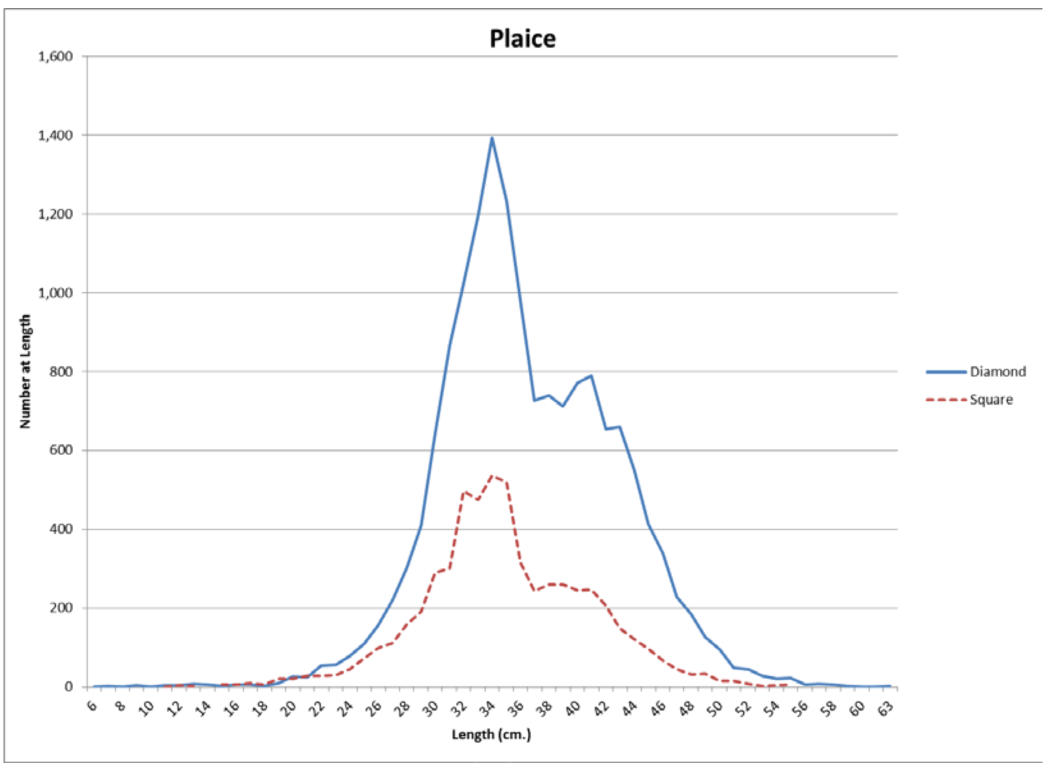
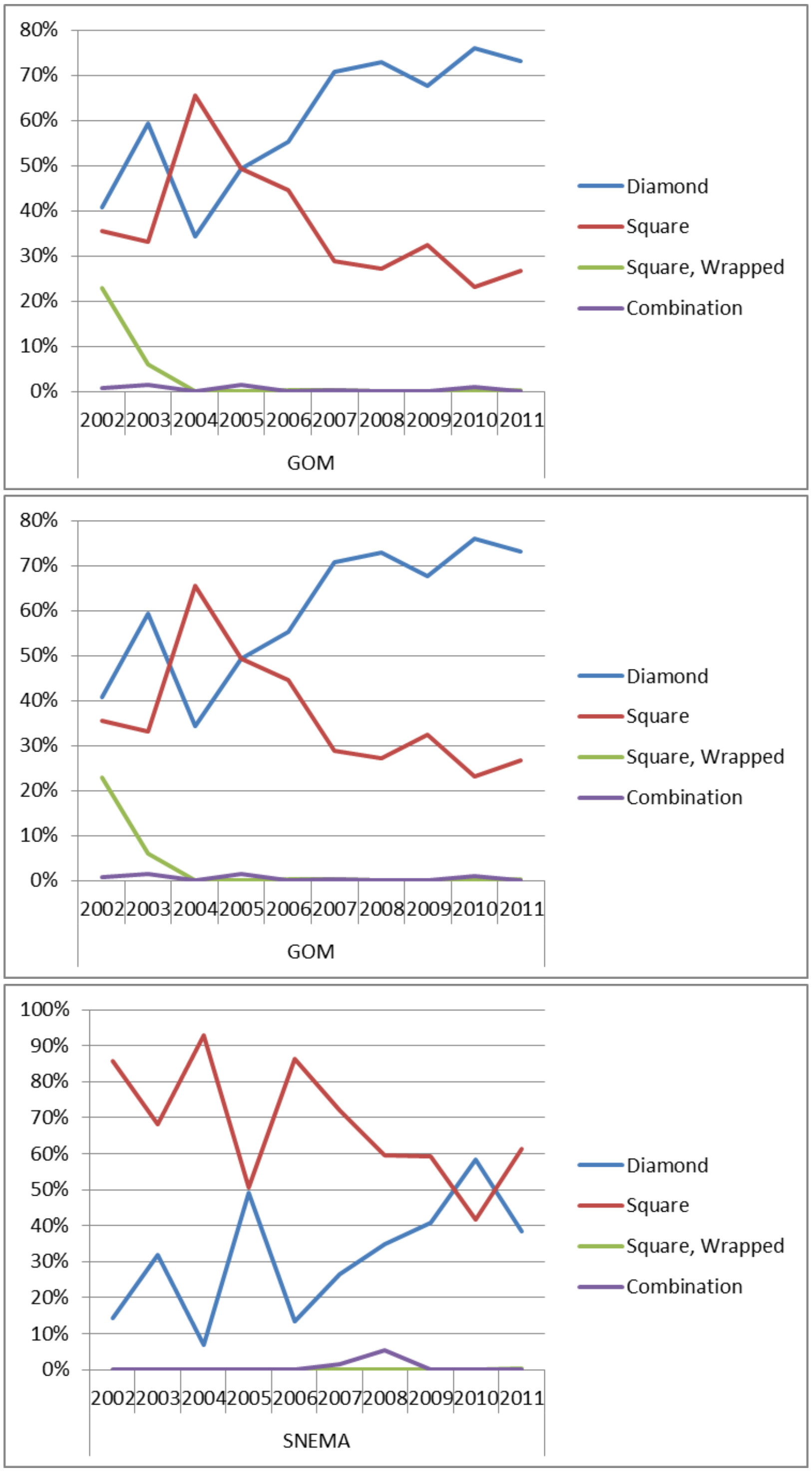

Plaice
Number at Length
1,600
1,400
1,200
1,000
800
600
400
200
0
Length (cm.)
Diamond
Square

Figure 151 – Percent of observed large mesh otter trawl tows retaining groundfish that used one of four reported mesh configurations



7.4.3.4 GB Yellowtail Flounder Management Measures

7.4.3.4.1 Option 1: No Action

Option 1 would not change the current discard rates used for GB yellowtail quota monitoring nor does it change the existing regulatory requirements for the small-mesh bottom-trawl fishery. No new economic impacts are expected.

7.4.3.4.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder *(Preferred Alternative)*

Option 2 would modify the spatial stratification used to estimate discards for in-season quota monitoring. A separate discard rate would be calculated for statistical area 522 from all other GB yellowtail flounder statistical areas. There are a number of potential economic impacts associated with this option. If the discard rate is lowered in area 522, vessels fishing in that area will be able to expend less GB yellowtail quota on each trip, increasing net revenues by allowing for more fishing. This is expected to have the largest effect on trawl vessels since they are the vessels that predominantly fish in area 522. If area 522 is removed from the discard rate calculation for other areas, it is likely the discard rate for other areas wouldbe higher than in the past (Section 7.1.2.5.2). This will represent decreased net revenues to vessels fishing in those areas because the opportunity cost of quota will likely increase. If area 522 becomes relatively more profitable to fish in than the other statistical areas, there could be a shift in spatial effort to area 522 by other trawl vessels. This could have unforeseen impacts on area-specific fishing levels, which could have negative long-term MSY consequences.

7.4.3.4.3 Option 3: Small-mesh Fishery Bottom Trawl Gear Requirements *(Preferred Alternative)*

Option 3, which can be adopted on its own or in conjunction with Option 2, will require small mesh vessels on non-groundfish trips (not fishing on a groundfish DAS or sector trip) in statistical areas 522, 525, 561, or 562 to use trawl gear designed to minimize the catch of flounder species.

By reducing the flounder bycatch discards in the small-mesh fishery, it is less likely that overfishing will occur in these areas and catch rates of groundfish trips may increase slightly for groundfish vessels resulting in higher net revenue. Groundfish sub-ACLs could be increased slightly as a result of reduced discards.

The small-mesh fishermen would likely experience higher costs including the fixed cost of purchasing new gear/modifying existing gear. Their operating costs would probably increase due to the gear restrictions (lower catch rates) effectively lowering their net revenue and overall profitability.

7.4.3.5 Sector Management Provisions – Allowed Exemption Requests

The economic benefits from the proposed closed area sector exemptions are expected to arise from two main sources; 1) increasing the revenue from fishing or 2) decreasing the costs of fishing. The underlying reason for exempting sectors from closed areas is to provide fishermen more flexibility and options in when and how to fish. The economic costs of sector exemptions would be caused by impacts on fish productivity, impact on non-targeted species, and gear interactions and effort displacement from other fisheries. Specific benefits and costs are explained below, with a discussion of their expected magnitude based on the analysis contained within this document. It should be noted that the same data issues limiting the biological analysis of this alternative also limit the ability to quantify expected costs and benefits with any accuracy. The lack of survey data in general, and specifically for the winter and summer seasons, greatly restricts the ability to generate expectations surrounding the benefits and costs of exemptions, and makes the economic analysis highly uncertain. The analysis below also assumes the distribution of gear used inside any approved exemption areas would be similar to that seen in proximity to the closed areas. If, however, sectors ultimately decide to use different gear inside the closed areas, for example by employing separator or Ruhle trawls in much greater frequency, then the benefits outlined in this section likely would differ, given differences in gear selectivity. Section 6.6.3 identifies a total of 120.6 days fished from 8 sectors (NEFS11, NEFS12, NEFS13, NEFS2, NEFS5, NEFS7, NEFS9, and Sustainable Harvest Sector 1) within a 25 nm buffer of Closed Area II in 2011, and it is some fraction of this effort that is most likely to generate benefits from the area exemptions.

Revenue can increase through sector exemptions for a number of reasons, the first of which is if exemptions allow access to fish stocks which otherwise would not be harvestable. For example, a significant portion of of a given species could reside within the closed areas. This biomass concentration could be either seasonal or perpetual, but in any case means that fishermen do not have the opportunity to harvest the TAC due to geographical considerations. A seasonal concentration of biomass within closed areas could have also shifted landings to parts of the year that would otherwise be sub-optimal, such that opening the closed areas shifts effort to more optimal time periods. For example, an intertemporal shift in landings could allow fishermen to capitalize on price differentiation within the year, and thus fish when the catch itself is valued highest. The results of the analysis presented in Section 6.6.2 suggest that these biomass concentrations are likely to exist for Georges Bank haddock and yellowtail flounder, and more specifically in Closed Area II. Given the management alternatives for sub-ACL allotment in section 4.1.6.2, yellowtail flounder is unlikely to be targeted on groundfish trips. Conversely, increased access to the haddock stock is one of the main motivators for this alternative, and exemptions granted to Closed Area II are likely to lead to greater access to the haddock stock.

Table 89 and Table 90 provide a synopsis of revenue, at the haul level, generated within a ten nautical mile buffer zone of Closed Areas I and II respectively. 11 Although certain gears suffer from small sample sizes, this landings data is likely most representative of the fishing that can be expected in the Closed Area I and II exemption areas. Table 89 indicates that bottom trawl, separator trawl, and Ruhle trawl trips in the vicinity of Closed Area I generate a substantial portion of their per-haul revenue from haddock. Table 90 similarly highlights the importance of haddock for fishermen in the area of Closed Area II for bottom trawl, separator trawl, Ruhle trawl, and longline trips. Additionally, a relatively large portion of haul-level revenue for the bottom trawl is also generated from yellowtail flounder landings.

11 Tables 1 – 5 in this section represent sets and hauls for trips classified as groundfish in the Northeast Regional Office DMIS database, with either starting or end points within a 10 nautical mile buffer of each closed area. Entries are missing either due to a lack of observations, or data points with fewer than three fishermen aggregated, which were dropped due to privacy concerns.

Combined, the results of Section 6.6.2, Table 89 and Table 90 suggest that access to Closed Area I and Closed Area II likely will provide for increased revenue from haddock, but primarily from Closed Area II. The magnitude of this benefit is uncertain, and depends on the size and duration of the increase in catch per unit effort (CPUE) for this species, which cannot be quantified to any level of confidence. Special Access Programs currently allow fishing in Closed Area II, primarily using selective gear such as separator and Ruhle trawls, which fishermen use to selectively target haddock. Section 6.6.4 compares the haul level performance of trips in Closed Area II, and does not provide any obvious evidence of increased catch rates inside the proposed exemption area. There are many issues that confound the comparison of historic tows inside and outside of the exemption area as a means to understand future fishing behavior. These include differential targeting, seasonality effects, stock effects, and shifting fishing regulations. For example, the 2010 year class of haddock is expected to be large, and could provide for higher CPUE than what is represented in the historical comparison, potentially drawing additional effort to the area and providing larger benefits of access. Nevertheless, existing data does not suggest that the potential for additional revenue would result in a large influx of effort. Exemption areas provide some incentive to increase effort beyond what is strictly profit maximizing from a fisherman's perspective, if a "use it or lose it" mentality is pervasive, and in the short run, exploratory fishing would be expected to push effort above its long-run equilibrium. However, the amount of additional effort this would entail is highly uncertain. Given all the data available, the exemptions are not expected to provide significant benefits from accessing biomass concentrations.

The second manner in which fishing revenues might be increased by sector exemptions is through access to areas where species assemblages are more valuable. For example, given two hauls equal in every metric other than one is inside and one outside the closed area, the non-target species such as lobster, skates, monkfish, and scallops could provide higher revenue in the closed area if these species are more valuable/more abundant there. Table 89, Table 90, Table 91, Table 92 and Table 93 present average revenue from hauls falling within a 10 nautical mile buffer of the proposed exemption areas. The tables identify all species that contribute at least 5% of haul-level revenues in any given month. These tables indicate that non-groundfish FMP species contribute substantially to haul-level revenue in the vicinity of all closed areas being considered.

The following analysis depends on groundfish fishermen currently landing less than the permitted amount of non-groundfish species, as defined by Section 6.6.3. If, instead, groundfish fishermen are already landing the entirety of their permitted landings, then the effect of exemptions described below are likely neutral.

Lobster consistently appears as an important non-target species for hauls surrounding all closed areas. This general trend is particularly true for bottom trawls. Two competing arguments for this are there could be the greater abundance of lobster and/or the lower levels of gear conflict in these areas, both of which could make lobster harvest by groundfish trawls more profitable. A large amount of offshore lobster pot effort is thought to be concentrated in Closed Area II. If the concentration of lobster pot effort in Closed Area II is due to the increased lobster abundance, then groundfish fishermen could benefit from access to these areas. Closed Area II is the exemption area most likely to provide this benefit to fishermen, if it exists.

A similar argument for can be made for scallops in Closed Area I and II and Nantucket Lightship. All of these closed areas have historically been subject to significant effort from the scallop fishery, and to the extent that groundfish fishermen will gain access to areas with high scallop biomass, they could expect increased fishing revenue. However, given the regulations and distribution of scallop permits held by sector vessels, the benefits from this source are expected to be minimal.

Section 6.6.1 indicates that individual haddock, winter flounder, and cod are likely larger inside versus outside of the closed areas. To the extent that price premiums exist for larger individuals of these species, fishermen will benefit from access to them. Given the alternatives presented in Section 4.1.6.2 of this document, the quota of cod available to sector members is likely to drop precipitously next year. Even so, access to larger cod might induce some targeting of this species in the exemption areas. Given that both the price premium and abundance of larger individuals are uncertain, the magnitude of this benefit is difficult to assess. However, it is likely slightly positive.

Skates compose a portion of groundfish haul revenue in the vicinity of Closed Area I, Closed Area II, and Nantucket Lightship (Table 89, Table 90 and Table 92). Although there are potential benefits associated with increased access to the skate complex, the biological analysis within Framework 48 (Section 6.6.2) fails to identify how these benefits would be generated.

In summary, although fishermen are likely to see a positive effect on profits due to the additional flexibility that closed area exemptions would provide in targeting more valuable species assemblage, there is high uncertainty about the exact composition and magnitude of biomass in the closed areas considered.

A third manner in which revenue might be expected to increase through sector exemptions is through lower levels of unwanted bycatch, such as cod and yellowtail flounder, whose potential lower TAC in FY2013 is likely to restrict groundfish fishing. If the relative catch rates of cod and yellowtail to target species such as haddock, redfish, and pollock are lower inside the closed area, the opportunity cost of fishing in these areas are lower than outside of the areas. This results from the fact that more trips would be possible within the closed area as compared to outside the closed area before fishermen expended their quota, likely allowing higher profits to be generated by landing other targeted groundfish species. Given the data presented in theTable 89, Table 90, Table 91, Table 92 and Table 93 and the results of Section 6.6.2, this benefit is likely to be neutral, although there does seem to be lower catch levels of yellowtail flounder and cod in the Cashes Ledge exemption area. Lower levels of unwanted bycatch such as undersized haddock, redfish, and pollock in the closed areas would also lead to lower costs of sorting and culling the catch. The analysis presented in Section 6.6.1 suggests this benefit will be slightly positive, given the likelihood of larger haddock, winter flounder, and cod in closed areas. Lower bycatch of species such as spiny dogfish could result in lower costs of, and less frequent need for, gear repair. However, the analysis presented within this document does not allow the quantification of such an effect, if it exists.

The costs of fishing could also be lower in closed areas if these areas generally have higher CPUE for target species such as pollock, haddock, and redfish. Higher catch rates could result in shortening, or reducing the total number of, trips needed to land the same quantity of fish. This would increase profits by variable costs. As previously stated, increased catch rates of haddock within the Closed Area II exemption area are expected as a result of access to exemption areas. However, the duration of high catch rates is unclear, and depends on the behavior of both fishermen (how much effort flows into the closed areas) and the haddock (when and for how long they aggregate). This benefit is thus expected to be slightly positive.
If exemptions allow fishermen access to areas closer to their home ports, then the cost of fishing can also be reduced through decreased steam time to and from fishing grounds. The higher the relative biomass within the closed area, the more trips fishermen will shift to the exempted areas as compared to other areas. The magnitude of this benefit depends not only on the total number of trips to newly opened areas, but also the characteristics of the trips that are being substituted. The higher the relative steaming costs of

substituted trips, and the larger the number of substituted trips, the larger the benefit. Section 6.6.2 indicates that, excepting haddock in Closed Area II, groundfish biomass inside the closed areas is similar to outside the closed areas. Thus, trips are more likely to displace effort locally, such that, for instance, effort around the Closed Area II is not likely to be drawn off to the Nantucket Lightship exemption area. Taken together, this indicates that the expected benefits from decreased steaming costs are likely to be neutral to slightly positive.

The largest economic costs of sector exemptions are expected to result from decreases in future productivity due to fishing mortality on critical life stages of target species and the additional impact on non-targeted species such as scallops, lobster, wolfish, and halibut. Critical life stages include spawning fish, juveniles, and important population age and size structures. The increased fecundity and juvenile survival rates of large mature females have already been mentioned in Section 6.6.1. Given the results of that same section, larger haddock, winter flounder, and cod are expected to be found in the proposed exemption areas. However, there is no direct manner to link these larger individuals to an increase in expected population. Thus the cost, in terms of forgone biomass, is uncertain. The previous conclusions that exemption area access is unlikely to result in large profit increases, and trips are expected to displace local effort, suggests that the cost in foregone biomass is likely to be minimal. However, there is great uncertainty regarding the FY2013 effort distribution. Ultimately, substantially higher costs could result through increased fishing effort on critical life stages, particularly for Gulf of Maine cod and Georges Bank and Southern New England winter flounder, and if this effort affected future stock productivity.

Due to the lack of existing data, it is not possible to calculate the costs associated with increased fishing pressure on juveniles and spawning fish, if any. Section 7.1 suggests that the influx of a large amount of effort could significantly impact the spawning of cod, winter flounder, and yellowtail flounder in Georges Bank, and winter flounder in Southern New England. A large influx of effort would likewise impact the rebuilding potential for Georges Bank cod and yellowtail flounder, as well as Southern New England winter flounder and Gulf of Maine cod and could greatly stress the Georges Bank and Southern New England winter flounder subpopulations. Increases in unreported/underreported discard levels in order to avoid binding quota caps could also pose a problem for these species in the face of high effort levels. This analysis has already indicated that the expected increase in profits due to fishing in exemption areas do not seem to justify large shifts of effort, but that effort flow is highly uncertain given alternative incentives and data availability.

Similarly, the analysis within this document does not allow the effect on non-target species such as scallops, wolffish (due to questions regarding survey trawl catchability), and halibut to be calculated. However, the analysis in Section 6.6.1 does suggest a fall concentration of egg-bearing lobster within Closed Area II. To the extent that effort flows into the closure during that time period, negative effects on productivity for this species can be expected. Generally, if there is increased effort on areas with high densities of scallop, lobsters, and other non-target species, both observed and unobserved mortality could increase for these species. Alternatively, if efficiency gains lead to a shorter time in which groundfish gear is in the water, the net effect of these exemptions could actually be to decrease this mortality on non-targeted species. Ultimately both the sign (positive or negative) and magnitude of this potential effect is unclear.

Increased fishing gear interactions and potential displacement of existing non-groundfish fishing effort to within the exemption areas are other potential costs of this alternative. For example, it has already been noted that Closed Area II currently supports a large amount of lobster pot fishing. The increased costs accruing to the lobster pot fishery, due for example to lost pots if strings are trawled over, depend on the flow of effort into the exemption area, and the gear conflict avoidance measures taken by both lobstermen and groundfish fishermen. If, for example, groundfish fishermen take pains in avoiding pot strings, then these costs are expected to be minimal. However, the lobster pot/groundfish interaction is likely to be idiosyncratic, given that there is no manner to ensure due care is taken in avoidance by either groundfish fishermen or lobstermen. This effect is likely to be slightly negative, given the groundfish effort currently surrounding Closed Area II (Section 6.6.3).

Use conflict concerns have also been raised for the recreational fishery, particularly in the Western Gulf of Maine and Cashes Ledge exemption areas. Figure 152 maps reported vessel trip report (VTR) points within the Gulf of Maine between fishing year 2006 and 2012. From this figure, there does not seem to be a shift in effort towards the vicinity of the exemption areas across time. Figure 153 graphs the number of recreational angler trips in the Gulf of Maine, broken down between anglers inside and outside the WGOM and Cashes Ledge exemption areas, by target species. The target species were defined as the species with the largest recorded landings for each trip. As per the wording of this alternative, these exemptions would not apply to periods in which the exemption areas overlap with rolling closures, and thus trips within the overlap of the rolling closure and WGOM exemption area were not included in the number that would be potentially affected. As can be seen from Figure 153 a very small portion of angler trips record VTR points within either of the proposed exemption areas. Only 429 out of 24,092 total recreational trips within the Gulf of Maine (just under 2 percent) report VTR points within the two proposed exemption areas between FY06 and FY2012. The 429 trips were made by 265 distinct permit holders. Figure 154 further subdivides the trips falling into the exemption areas between the WGOM and Cashes Ledge closures, with the WGOM exemption area representing the bulk of these anglers. A total of 60 trips by 12 permit holders have been reported to date within the WGOM exemption area in FY2012, as compared to 59 trips by 18 permit holders in FY2011, and 64 trips by 18 permit holders in 2010. The number of trips in FY2012 could suggest an increasing trend, given that this fishing year is still ongoing. However, there is no strong evidence of a large shift in effort distribution into the WGOM exemption area using the VTR data. Overall, these data suggest that gear conflicts between the commercial and recreational fisheries are unlikely to be significant. The major caveat to this analysis is the coarse resolution of the VTR points, which represent a centroid of fishing effort. Given this, it is highly probable that at least a portion of the recreational trips with VTR points outside of the closed areas spent some time in the exemption areas. Nevertheless the data does not allow analysis to any greater resolution than provided here.

In summation, both the benefits and costs associated with opening area closures are highly uncertain. In the short run, there are non-negative net benefits to groundfish fishermen to opening areas up to harvest, as it gives fishermen more flexibility in where and when to fish. Trips targeting haddock are expected to reap the largest short-term gains due to this additional access, and in particular these benefits are likely to accrue to individuals currently fishing in the vicinity of Closed Area II. The costs primarily stem from lost the potential for future productivity, both to target and non-target species, as well as to increases in conflicts with other fisheries such as the recreational and commercial lobster fisheries. Given the expected low influx of effort into the exemption areas, these costs are thought to be relatively low. The overall net benefits are then expected to be neutral or slightly positive, given the full analysis of this alternative, and with all the previously identified caveats. This result is far from certain, given the data available, and there is potential for much greater costs if the exemptions place high amounts of fishing pressure on critical life stages, such that future productivity is affected, or greater gear interactions ensue. These additional costs could result in a negative net benefit of undetermined magnitude and represents the substantial risk of Option 2 compared to the No Action alternative.

Table 89. Closed Area I: Average revenue per haul (calendar year 2007-2011) within a 10 nautical mile buffer, and percent of total haul revenue this value represents, for species of interest in Framework 48. NEFOP and ASM observer landings data.

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bottom Trawl	Total Hauls	444	680	641	478	304	1,222	1,293	1,342	1,336	1,410	1,187	445
	Cod	$171	$370	$405	$480	$220	$176	$175	$146	$178	$203	$ 164	$143
		19%	26%	41%	43%	16%	13%	17%	15%	21%	22%	17%	12%
	Haddock	$173	$606	$404	$309	$937	$920	$313	$202	$163	$208	$ 214	$310
		19%	43%	40%	28%	66%	66%	31%	21%	19%	22%	22%	25%
	Yellowtail	$49	$11	$0	$5	$34	$9	$31	$61	$64	$76	$45	$36
		5%	1%	0%	0%	2%	1%	3%	6%	7%	8%	5%	3%
	Lobster	$166	$151	$106	$101	$35	$67	$64	$57	$39	$39	$69	$118
		18%	11%	11%	9%	2%	5%	6%	6%	5%	4%	7%	10%
	Winter Skate	$40	$16	$5	$18	$14	$22	$35	$49	$51	$44	$40	$9
		4%	1%	0%	2%	1%	2%	3%	5%	6%	5%	4%	1%
	Scallops	$46	$21	$0	$5	$24	$12	$27	$44	$16	$18	$14	$3
		5%	1%	0%	0%	2%	1%	3%	5%	2%	2%	1%	0%
	Winter Flounder	$11	$3	$1	$2	$20	$33	$174	$166	$94	$98	$203	$71
		1%	0%	0%	0%	1%	2%	17%	17%	11%	11%	21%	6%
	Witch Flounder	$58	$45	$22	$51	$20	$25	$30	$69	$80	$74	$76	$235
		6%	3%	2%	5%	1%	2%	3%	7%	9%	8%	8%	19%
	Monkfish	$76	$117	$29	$61	$17	$33	$43	$46	$61	$73	$72	$148
		8%	8%	3%	6%	1%	2%	4%	5%	7%	8%	7%	12%
	Plaice	$44	$31	$9	$37	$43	$55	$61	$67	$75	$52	$59	$98
		5%	2%	1%	3%	3%	4%	6%	7%	9%	6%	6%	8%
Ruhle Trawl	Total Hauls					13	94						
	Cod					$7	$187						
						0%	9%						
	Haddock					$2,065	$1,718						

						99%	86%						
	Yellowtail					$5	$32						
						0%	2%						
Fixed Gillnet	Total Hauls						128	196	129	211	93	40	30
	Cod						$128	$247	$431	$256	$677	$612	$292
							20%	47%	74%	55%	86%	71%	67%
	Haddock						$38	$56	$15	$16	$ 10	$14	$9
							6%	11%	3%	3%	1%	2%	2%
	Pollock						$4	$25	$49	$24	$ 13	$23	$56
							1%	5%	8%	5%	2%	3%	13%
	Lobster						$40	$17	$14	$14	$12	$51	$8
							6%	3%	2%	3%	2%	6%	2%
	Winter Skate						$336	$110	$44	$120	$45	$143	$31
							52%	21%	8%	26%	6%	16%	7%
	Skate						$10	$28	$0	$8	$14	$-	$-
							2%	5%	0%	2%	2%		
	Spiny Dogfish						$73	$29	$6	$0	$-	$-	$-
Separator Trawl	Total Hauls	26	15		18	45	204	142	46	115	89	27	11
	Cod	$151	$408		$99	$ 144	$171	$33	$106	$67	$139	$173	$20
		9%	56%		3%	8%	7%	3%	11%	8%	12%	10%	4%
	Haddock	$1,083	$166		$2,868	$1,578	$2,277	$933	$465	$564	$751	$1,055	$350
		65%	23%		92%	87%	88%	91%	49%	67%	63%	62%	66%
	Redfish	$25	$1		$56	$0	$4	$3	$36	$23	$27	$122	$9
		1%	0%		2%	0%	0%	0%	4%	3%	2%	7%	2%
	Pollock	$259	$63		$6	$23	$31	$9	$7	$116	$37	$45	$6
		15%	9%		0%	1%	1%	1%	1%	14%	3%	3%	1%
	Yellowtail	$1	$-		$25	$17	$4	$7	$51	$5	$78	$1	$13
		0%			1%	1%	0%	1%	5%	1%	7%	0%	2%
	Lobster	$89	$9		$36	$5	$16	$10	$5	$2	$4	$17	$42

		5%	1%		1%	0%	1%	1%	1%	0%	0%	1%	8%
Longline	Total Hauls									31			
	Cod									$321			
										79%			
	Haddock									$65			
										16%			
	Redfish									$1			
										0%			

Table 90. Closed Area II: Average monthly revenue per haul (calendar year 2007 - 2011) within a 10 nautical mile buffer, and percent of total haul revenue this value represents, for species of interest in Framework 48. NEFOP and ASM observer landings data.

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bottom Trawl	Total Hauls	758	85	449	1,560	1,332	1,024	517	835	659	652	798	1,107
	Cod	$57	$247	$227	$327	$137	$129	$60	$96	$68	$45	$64	$144
		5%	17%	13%	17%	8%	11%	4%	7%	6%	3%	5%	8%
	Haddock	$193	$53	$584	$949	$798	$372	$237	$412	$371	$332	$493	$684
		16%	4%	34%	49%	47%	30%	16%	29%	31%	25%	35%	37%
	Yellowtail	$438	$95	$28	$190	$341	$203	$338	$186	$154	$245	$215	$397
		36%	7%	2%	10%	20%	17%	23%	13%	13%	18%	15%	22%
	Scallop	$167	$34	$40	$62	$105	$61	$121	$62	$65	$122	$43	$168
		14%	2%	2%	3%	6%	5%	8%	4%	5%	9%	3%	9%
	Winter Flounder	$96	$31	$34	$92	$156	$247	$495	$315	$157	$225	$357	$249
		8%	2%	2%	5%	9%	20%	34%	22%	13%	17%	25%	14%
	Witch Flounder	$15	$70	$39	$31	$48	$45	$18	$50	$66	$91	$41	$13
		1%	5%	2%	2%	3%	4%	1%	4%	6%	7%	3%	1%
	Winter Skate	$117	$82	$141	$53	$22	$37	$19	$35	$155	$100	$52	$50
		10%	6%	8%	3%	1%	3%	1%	2%	13%	7%	4%	3%
	White Hake	$6	$188	$78	$29	$7	$2	$2	$5	$7	$5	$15	$9
		0%	13%	4%	2%	0%	0%	0%	0%	1%	0%	1%	1%
	Lobster	$48	$412	$394	$103	$21	$61	$84	$149	$56	$62	$56	$22
		4%	29%	23%	5%	1%	5%	6%	11%	5%	5%	4%	1%
	Monkfish	$38	$80	$99	$40	$25	$39	$52	$44	$76	$86	$49	$49
		3%	6%	6%	2%	1%	3%	4%	3%	6%	6%	3%	3%
Separator Trawl	Total Hauls	151	29	80	179	78	73	33	17	54	29	140	159
	Cod	109	91	159	516	189	31	6	19	31	71	129	193

		5%	4%	5%	18%	6%	2%	1%	1%	2%	7%	7%	8%
	Haddock	1,915	689	2,567	1,686	2,554	1,580	956	1,223	1,319	648	1,401	1,988
		83%	30%	87%	60%	83%	88%	84%	94%	84%	66%	73%	82%
	Pollock	145	337	17	13	4	9	-	2	21	16	130	37
		6%	14%	1%	0%	0%	1%		0%	1%	2%	7%	2%
	Yellowtail	28	28	9	153	127	19	107	2	8	17	70	52
		1%	1%	0%	5%	4%	1%	9%	0%	1%	2%	4%	2%
	Lobster	28	184	91	176	1	68	9	16	19	5	13	5
		1%	8%	3%	6%	0%	4%	1%	1%	1%	1%	1%	0%
	Monkfish	$9	$16	$17	$16	$2	$22	$14	$8	$27	$55	$5	$6
		0%	1%	1%	1%	0%	1%	1%	1%	2%	6%	0%	0%
	Winter Flounder	$32	$6	$26	$167	$191	$29	$13	$0	$0	$-	$119	$93
		1%	0%	1%	6%	6%	2%	1%	0%	0%		6%	4%
	Witch Flounder	$4	$35	$7	$19	$0	$18	$5	$18	$93	$60	$19	$6
		0%	1%	0%	1%	0%	1%	0%	1%	6%	6%	1%	0%
	White Hake	$24	$881	$32	$43	$-	$6	$-	$3	$18	$74	$10	$40
		1%	38%	1%	2%		0%		0%	1%	8%	1%	2%
Longline	Total Hauls				79	103							
	Cod				386	275							
					30%	23%							
	Haddock				881	900							
					69%	76%							
Ruhle Trawl	Total Hauls		6	30	50	49							
	Cod		$14	$567	$73	$5							
			3%	25%	2%	0%							
	Haddock		$325	$1,416	$2,994	$969							
			74%	62%	96%	94%							
	Yellowtail		$95	$193	$41	$15							

	21%	9%	1%	1%

Table 91. Cashes Ledge: Average monthly revenue per haul (calendar year 2007 - 2011) within a 10 nautical mile buffer, and percent of total haul revenue this value represents, for species of interest in Framework 48. NEFOP and ASM observer landings data.

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bottom Trawl	Total Hauls	299	273	509	152	74	66	130	156	145	302	157	221
	Cod	$51	$55	$64	$92	$26	$12	$20	$9	$19	$46	$34	$42
		3%	3%	4%	5%	2%	1%	2%	1%	2%	4%	3%	2%
	Redfish	$45	$107	$59	$59	$112	$56	$220	$139	$166	$93	$148	$226
		3%	6%	4%	3%	10%	4%	17%	13%	16%	8%	14%	12%
	Pollock	$321	$362	$578	$694	$225	$443	$293	$293	$181	$388	$173	$155
		21%	19%	34%	40%	20%	34%	23%	27%	18%	35%	16%	8%
	Plaice	$227	$172	$139	$141	$98	$93	$118	$149	$171	$160	$211	$131
		15%	9%	8%	8%	9%	7%	9%	13%	17%	14%	20%	7%
	Witch Flounder	$160	$300	$241	$232	$132	$48	$63	$52	$48	$76	$63	$352
		10%	16%	14%	13%	12%	4%	5%	5%	5%	7%	6%	19%
	White Hake	$150	$145	$92	$118	$196	$240	$179	$150	$181	$141	$120	$144
		10%	8%	5%	7%	18%	18%	14%	14%	18%	13%	11%	8%
	Monkfish	$485	$608	$370	$313	$234	$253	$258	$249	$236	$176	$241	$679
		32%	33%	22%	18%	21%	19%	20%	23%	23%	16%	23%	37%
	Lobster	$53	$79	$65	$67	$54	$146	$100	$43	$9	$8	$13	$68
		3%	4%	3%	4%	5%	12%	8%	4%	1%	1%	1%	3%
Fixed Gillnet	Total Hauls	96	27	86	53	73	52	149	110	103	64	65	
	Cod	80	43	37	91	98	63	106	130	98	96	128	
		9%	5%	5%	13%	18%	8%	14%	18%	14%	17%	17%	
	Haddock	16	6	9	22	5	4	4	2	2	6	8	
		2%	1%	1%	3%	1%	1%	1%	0%	0%	1%	1%	
	Redfish	12	14	13	6	9	35	16	7	11	14	21	

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
		1%	2%	2%	1%	2%	5%	2%	1%	2%	3%	3%	
	Pollock	591	653	558	478	57	129	215	305	335	209	420	
		70%	80%	71%	69%	10%	17%	29%	42%	48%	38%	55%	
	White Hake	37	55	73	21	283	423	193	143	103	83	76	
		4%	7%	9%	3%	51%	57%	26%	20%	15%	15%	10%	
	Lobster	$32	$37	$17	$4	$44	$37	$69	$10	$22	$7	$7	
		4%	5%	2%	1%	8%	5%	9%	1%	3%	1%	1%	
Separator Trawl	Total Hauls						32				19		
	Cod						$41				$38		
							3%				4%		
	Haddock						$32				$69		
							2%				7%		
	Redfish						$1,200				$83		
							77%				8%		
	Pollock						$78				$669		
							5%				64%		
	White Hake						$70				$124		
							4%				12%		

Table 92 - Nantucket Lightship: Average monthly revenue per haul (calendar year 2007 - 2011) within a 10 nautical mile buffer, and percent of total haul revenue this value represents, for species of interest in Framework 48. NEFOP and ASM observer landings data.

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bottom Trawl	Total Hauls	57	136	26	124	50	63	18	58			13	
	Cod	$3	$1	$5	$1	$0	$13	$43	$146			$189	
		0%	0%	0%	0%	0%	2%	9%	26%			54%	
	Haddock	$1	$0	$5	$-	$-	$179	$99	$4			$-	
		0%	0%	0%			25%	20%	1%				
	Yellowtail	$97	$70	$2	$15	$7	$27	$28	$19			$1	
		12%	6%	0%	2%	1%	4%	6%	3%			0%	
	Monkfish	$174	$152	$82	$194	$366	$42	$96	$39			$7	
		21%	13%	7%	21%	54%	6%	19%	7%			2%	
	Winter Skate	$305	$636	$194	$474	$241	$13	$15	$13			$55	
		37%	56%	17%	51%	36%	2%	3%	2%			16%	
	Winter Flounder	$ 55	$1	$8	$1	$3	$351	$135	$284			$70	
		7%	0%	1%	0%	0%	49%	27%	50%			20%	
	Summer Flounder	$106	129	764	157	21	40	3	11			5	
		13%	11%	67%	17%	3%	6%	1%	2%			1%	
	Skate	$60	$127	$62	$51	$2	$0	$-	$-			$3	
		7%	11%	5%	5%	0%	0%					1%	
	Lobster	$1	$1	$0	$0	$1	$36	$38	$41			$22	
		0%	0%	0%	0%	0%	5%	8%	7%			6%	
Fixed Gillnet	Total Hauls	35	69	59	71	143	33						
	Monkfish	$629	$539	$260	$604	$666	$657						
		78%	54%	32%	65%	84%	95%						
	Winter Skate	$176	$339	$511	$323	$111	$23						
		22%	34%	64%	35%	14%	3%						

	Month											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Skate	$-	$112	$16	$-	$1	$ -						
		11%	2%		0%							

Table 93. Western Gulf of Maine: Average monthly revenue per haul (calendar year 2007 - 2011) within a 10 nautical mile buffer, and percent of total haul revenue this value represents, for species of interest in Framework 48. NEFOP and ASM observer landings data.

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bottom Trawl	Total Hauls	1,256	1,357	1,432	686	540	354	528	608	648	734	824	951
	Cod	$245	$349	$368	$302	$616	$365	$313	$499	$648	$739	$523	$489
		17%	20%	23%	21%	33%	27%	30%	44%	58%	54%	45%	34%
	Haddock	$17	$97	$126	$7	$76	$48	$16	$24	$39	$39	$25	$26
		1%	5%	8%	0%	4%	4%	2%	2%	3%	3%	2%	2%
	Redfish	$41	$81	$69	$86	$82	$60	$28	$20	$22	$22	$23	$29
		3%	5%	4%	6%	4%	4%	3%	2%	2%	2%	2%	2%
	Pollock	$240	$327	$268	$357	$565	$359	$204	$256	$140	$140	$115	$204
		17%	18%	17%	25%	30%	27%	20%	23%	12%	10%	10%	14%
	Monkfish	$278	$280	$205	$135	$116	$101	$98	$77	$70	$90	$127	$160
		19%	16%	13%	9%	6%	8%	9%	7%	6%	7%	11%	11%
	Witch Flounder	$182	$161	$115	$116	$65	$38	$56	$44	$64	$116	$84	$126
		13%	9%	7%	8%	3%	3%	5%	4%	6%	8%	7%	9%
	Plaice	$133	$131	$110	$93	$57	$102	$129	$79	$52	$102	$118	$118
		9%	7%	7%	6%	3%	8%	12%	7%	5%	7%	10%	8%
	White Hake	$157	$210	$187	$257	$226	$167	$106	$71	$52	$79	88	90
		11%	12%	12%	18%	12%	13%	10%	6%	5%	6%	8%	6%
	Lobster	$76	$87	$53	$52	$58	$63	$46	$17	$5	$5	29	56
		5%	5%	3%	4%	3%	5%	4%	2%	0%	0%	3%	4%
Longline	Total Hauls	67	120	323		62							24
	Cod	$550	$377	$122		$241							$447
		91%	92%	40%		41%							90%
	Haddock	$50	$31	$176		$307							$34

		Month											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
		8%	7%	58%		53%							7%
Fixed Gillnet	Total Hauls	799	610	649	95	402	709	848	979	966	926	828	761
	Cod	$483	$306	$178	$289	$489	$450	$559	$661	$642	$765	$826	$649
		45%	48%	43%	66%	74%	26%	51%	58%	61%	60%	52%	36%
	Haddock	$6	$24	$60	$4	$3	$6	$3	$3	$3	$34	$5	$5
		1%	4%	15%	1%	0%	0%	0%	0%	0%	3%	0%	0%
	Pollock	$458	$121	$6	$106	$22	$861	$217	$173	$230	$329	$659	$1,014
		43%	19%	1%	24%	3%	50%	20%	15%	22%	26%	41%	57%
	Yellowtail	$35	$117	$127	$11	$5	$2	$1	$0	$0	$0	$0	$1
		3%	18%	31%	2%	1%	0%	0%	0%	0%	0%	0%	0%
	Spiny Dogfish	$-	$-	$-	$-	$15	$48	$143	$76	$2	$0	$0	$-
						2%	3%	13%	7%	0%	0%	0%	
	Monkfish	$13	$1	$0	$1	$24	$49	$66	$59	$45	$45	$54	$45
		1%	0%	0%	0%	4%	3%	6%	5%	4%	4%	3%	2%
Separator Trawl	Total Hauls				25		19		11	4			
	Cod				$367		$875		$1,344	$907			
					23%		47%		66%	63%			
	Haddock				$7		$130		$9	$7			
					0%		7%		0%	1%			
	Redfish				$312		$241		$89	$279			
					20%		13%		4%	19%			
	Pollock				$626		$474		$466	$182			
					39%		26%		23%	13%			
	Lobster				$127		$18		$6	$13			
					8%		1%		0%	1%			
Handline	Total Hauls	175	57	22									9

	Month											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Cod	$125	$93	$111									$84
	100%	100%	100%									99%

Figure 152. Vessel trip report locations within the Gulf of Maine, highlighting both the WGOM and Cashes Ledge exemption areas under consideration.

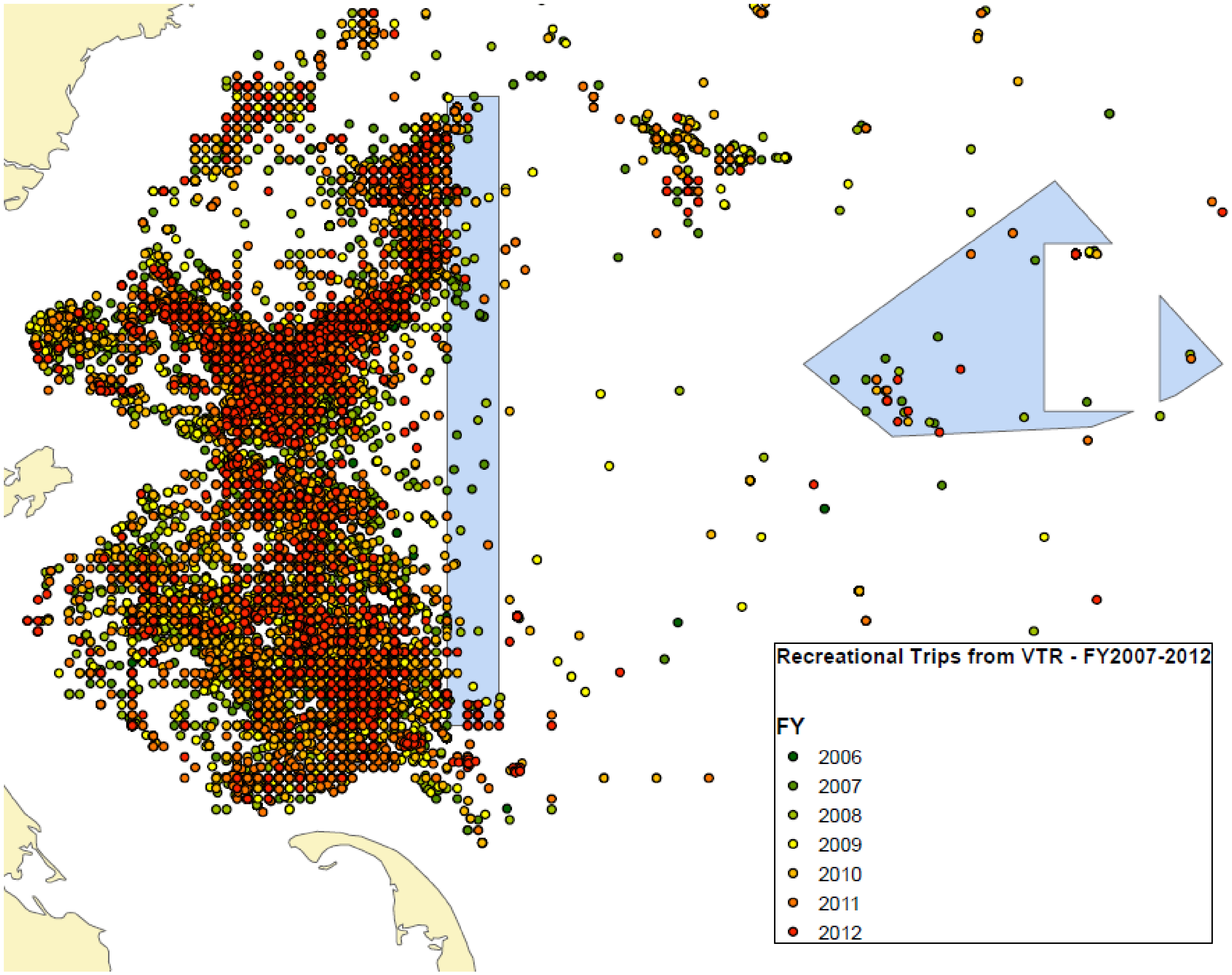


Figure 153. Total number of recreational anglers in the Gulf of Maine, delineating trips inside and outside of the WGOM and Cashes Ledge exemption areas, by year and target species.

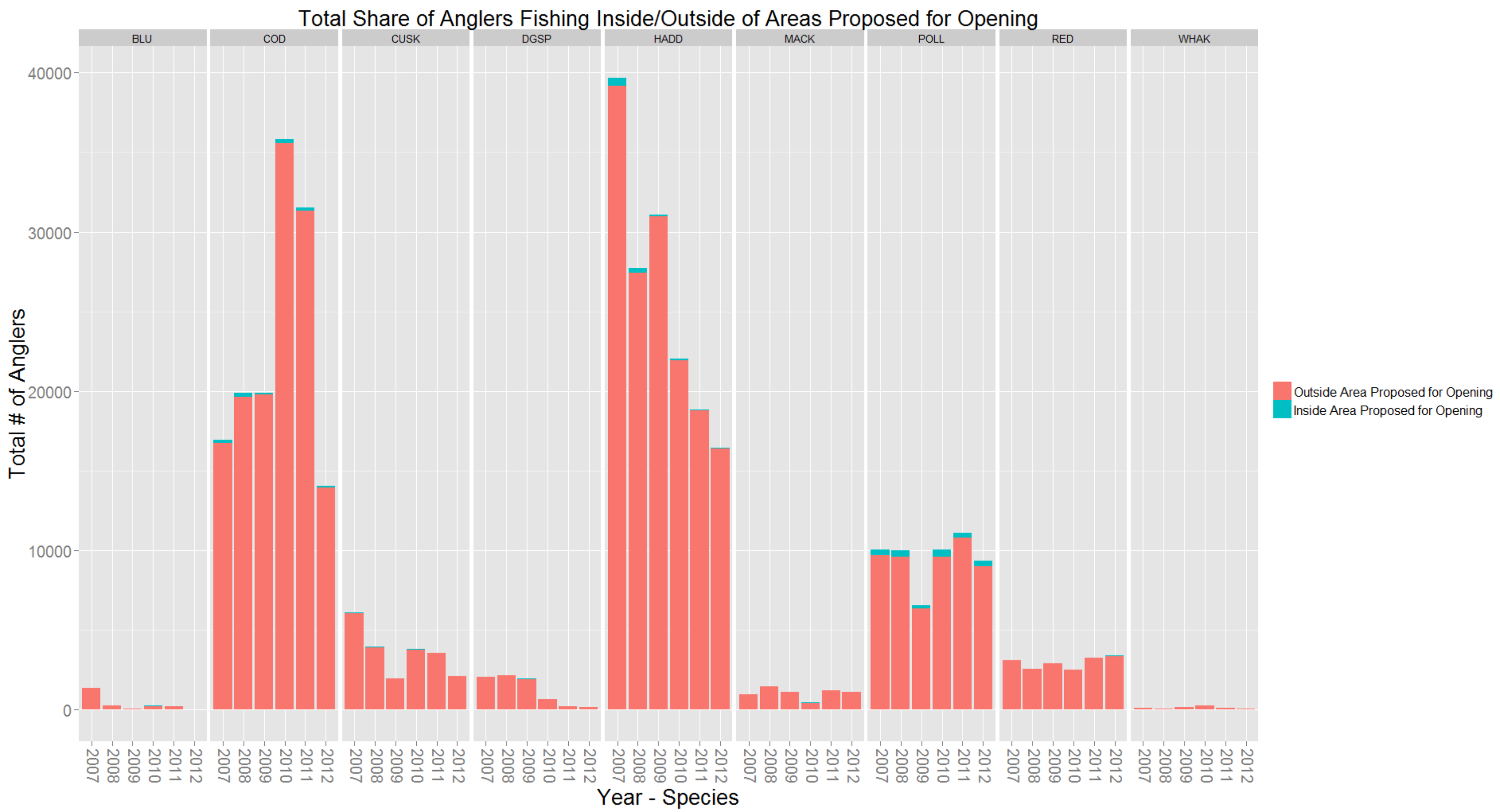
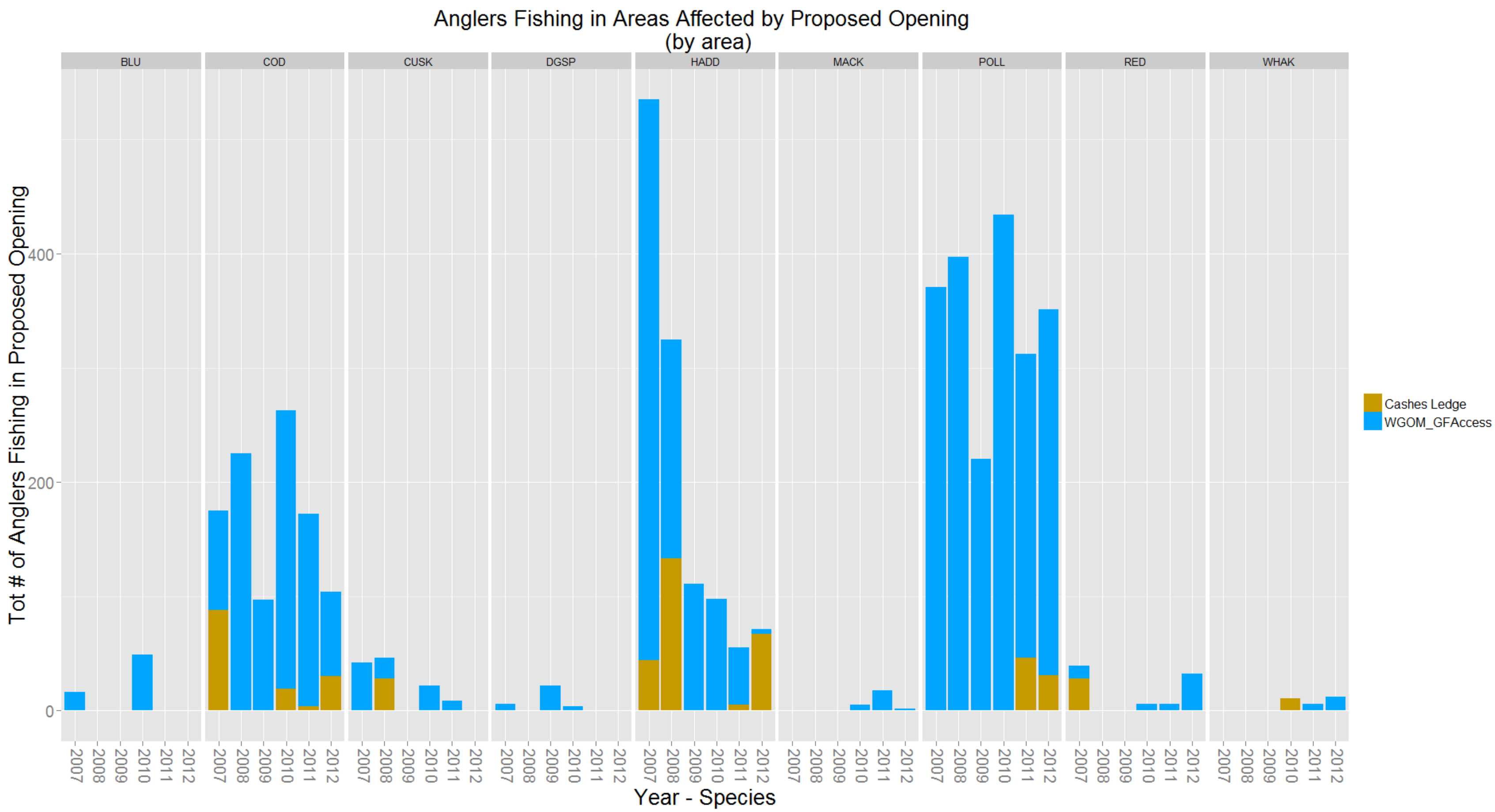


Figure 154. Total anglers within the Cashes Ledge and WGOM exemption areas, delineated between the two closures, by year and target species



7.4.3.6 Commercial Fishery Accountability Measures

7.4.3.6.1 Option 1: No Action

Option 1 would retain current commercial fishery AMs as defined in Amendment 16. There are no new economic impacts expected.

7.4.3.6.2 Option 2: Change to AM Timing for Stocks Not Allocated to Sectors *(Preferred Alternative)*

Under Option 2, AMs for non-allocated stocks would go into effect at the start of the following fishing year from when an ACL overage was detected. This would allow AMs to happen faster than they have in the past, thus preventing further overfishing of non-allocated stocks in subsequent years. In the long run there is a positive stock impact expected from reducing consecutive years of overfishing, ultimately leading to higher MSY, ACLs, and catch rates. Under this option, AMs would not go into effect in-season, allowing fishing businesses to better manage the timing of their harvests and thus maximize profits. Faster implementation of AMs could create short-term negative economic impacts, since landings will become restricted sooner than they would have under Option 1.

7.4.3.6.3 Option 3: Area-Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder *(Preferred Alternative)*

Economic impact estimates are based on the types of fishing trips likely to be affected, as reported in the VTR and observer databases. No distinction is made between Sector and common pool vessels. VTR trips from FY 2010 reporting latitude and longitudes inside affected areas are used for estimating economic impacts. Data used for assessing the catch rates of selective gears (separator trawl, Rhule trawl) are from FY2010 and FY2011. Gross revenues encompass all revenues from groundfish permitted vessels on trips on which at least one pound of groundfish was landed.

The AM areas considered here are small, so the trips with positions falling inside their boundaries comprise only a sample of impacted trips. For FY2010, 61.9 percent of all trips reported latitude and longitude data and it is impossible to determine the accuracy of the coordinate data (Figure 155). As the location of an entire trip is coded at one particular point, these coordinate data are assumed to be approximate and to broadly represent the type and level of activities in these areas. All gross revenues reported here are prorated from the sample population to total population estimate by inflating revenues by the appropriate percentage based on trips reporting and not reporting lat/lon data for the gear type and statistical area(s) best corresponding to each proposed management area.

Figure 155 - Number of trips reporting positional data in FY 2010, with revenues generated

	Reporting lat/lon	Not reporting lat/lon
number trips	13,192	8,374
total revenues	$ 113,081,991	$ 115,855,503
% total revenues	49%	51%

Atlantic halibut:

If adopted, this sub-option would: (1) require the use of selective trawl gear in specified trawl halibut AM areas, (2) prohibit sink gillnet and longline vessel operation in specified fixed gear halibut AM areas, and (3) set a zero possession limit for halibut for all vessels.

Trawl vessel restrictions

This sub-option would require the use of selective trawl gears in the proposed trawl halibut AM area, similar to the windowpane options discussed below. Approximately $5.5 million dollars of estimated gross revenues came from this area with trawl gears in FY 2010 (Figure 156).

Figure 156 - Gross revenue from VTR trips reported inside the proposed Atlantic halibut trawl AM area during FY2010

Port	Gross Revenue
Boston, MA	$ 204,404
Gloucester, MA	$ 445,429
New Bedford, MA	$ 4,606,611
Nantucket, MA	$ 122,397
Barnstable, MA	$ 1,589
Point Judith, RI	$ 56,062
Grand Total	$ 5,436,491

Selective gears again substantially change the composition of the catch inside the windowpane and ocean pout large areas. Both VTR and observer data collected from tows inside the areas show a much higher proportion of haddock and lower proportion of flatfish relative to traditional trawl gears (Table 94).

Table 94 - Proportion of total kept catch from VTR and on observed trips using selective (separator, Ruhle) and traditional (otter) trawl gears inside Atlantic halibut trawl restriction area.

	Observer				**VTR**			
	selective		**traditional**		**selective**		**traditional**	
cod	$ 35,711	13.8%	$ 364,444	17.5%	$ 13,590	23.1%	$ 727,859	13.5%
haddock	$ 129,036	50.0%	$ 784,196	37.6%	$ 35,445	60.3%	$1,738,837	32.3%
flats	$ 11,895	4.6%	$ 272,928	13.1%	$ 3,624	6.2%	$1,002,378	18.6%
pollock	$ 50,824	19.7%	$ 116,162	5.6%	$ 3,746	6.4%	$ 190,192	3.5%
white hake	$ 40	0.0%	$ 513	0.0%	$ -	0.0%	$ 588	0.0%
skates	$ 2,306	0.9%	$ 25,317	1.2%	$ -	0.0%	$1,004,889	18.7%
other	$ 28,224	10.9%	$ 520,649	25.0%	$ 29	3.9%	$ -	13.3%
squids	$ -	0.0%	$ 85	0.0%	$ 2,310	0.0%	$ 713,003	0.0%
Grand Total	$ 258,036		$ 2,084,294		$ 58,745		$5,377,746	

As with the small windowpane areas, revenue per observed tow were about 12 percent higher with the selective gears than with traditional gear for observed tows in the large areas (Table 95).

Table 95 - Revenue per tow by two types of trawl gears from tows observed inside Atlantic halibut trawl restriction area.

Trawl net	Revenue per tow	number tows
selective	$ 1,518	172
traditional	$ 1,353	1541

Fixed gear vessel restrictions

This option would prohibit fishing with fixed gears. In this case, all of the fishing activities that occurred in these areas would be displaced, and the costs would be those associated with potentially lower catch rates and/or longer steaming time. Approximately $1 million in estimated revenue came from trips reported fishing inside these areas. The bulk of the revenue came from cod (Table 97).

Table 96 - Gross revenues from VTR trips reported inside the Atlantic halibut fixed gear restriction areas during FY2010.

Port	Gross revenue
Portland, ME	$ 58,196
Harpswell, ME	$ 63,342
Gloucester, MA	$ 268,373
Chatham, MA	$ 629,830
Portsmouth, NH	$ 1,878
Seabrook, NH	$ 14,005
Grand Total	$ 1,039,368

Table 97 - Revenue of total kept catch by species from VTR and on observed trips inside Atlantic halibut fixed gear restriction areas.

Species	Observer	VTR
cod	$ 16,677	$ 529,950
haddock	$ 4,812	$ 74,247
flats	$ 346	$ 34,350
pollock	$ 2,668	$ 154,034
white hake	$ 5	$ 271
skates	$ 765	$ 20,151
other	$ 4,527	$ -
squids	$ -	$ 226,365
Grand Total	$ 29,798	$ 1,039,368

Wolffish:

If adopted, this option would: (1) require the use of selective trawl gear in specified trawl wolffish AM areas, and (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear wolffish AM areas.

Trawl vessels

Almost $4 million dollars in gross revenues was caught inside the proposed trawl wolffish AM area. Of this revenue 85 percent was landed in Gloucester, MA. Like the trawl gear restriction areas, this option would require either the use of selective gear, to fish in this area with trawls.

Table 98 - Gross revenues from VTR trips reported inside the wolffish trawl gear restriction areas during FY2010.

Port	Gross revenue
Boston, MA	$ 102,735
Gloucester, MA	$ 3,368,563
Marshfield, MA	$ 18,913
New Bedford, MA	$ 57,683
Plymouth, MA	$ 176,587
Provincetown, MA	$ 1,221
Rockport, MA	$ 94,100
Portsmouth, NH	$ 19,423
Seabrook, NH	$ 18,529
Grand Total	$ 3,857,756

In FY 2010, selective gears were hardly utilized in these areas, with just one reported observed tow and no trips reported in the VTR (Table 99 and Table 100).

Table 99 – FY 2010 Revenue of total kept catch on observed trips using selective (separator, Rhule) and traditional (otter) trawl gears inside wolffish trawl restriction area.

	Observer		VTR	
	selective	**traditional**	**selective**	**traditional**
cod	$ 3,587	$ 432,268		$ 2,895,946
haddock	$ 205	$ 7,798		$ 41,116
flats	$ -	$ 45,404		$ 794,620
pollock	$ 82	$ 16,149		$ 49,452
white hake	$ -	$ 6		$ 10
skates	$ -	$ 9,187		$ 20,859
other	$ -	$ 14,313		$ 247
squids	$ -	$ 6		$ 55,504
Grand Total	$ 3,874	$ 625,130	$ -	$ 3,857,756

Table 100 – FY 2010 Revenue per tow by two types of trawl gears from tows observed inside wolffish trawl restriction area.

Trawl net	Revenue per tow	number tows
selective	$ 3,874	1
traditional	$ 1,823	345

Fixed gear vessels

Fixed gear vessels fishing out of Chatham, MA had estimated revenues of nearly $1 million in FY 2010 from fishing within the proposed wolffish AM area (Table 101). These trips would have to occur elsewhere, and while costs may go up slightly these revenues would be made up by fishing in other areas.

Table 101 - Gross revenue from VTR trips reported inside the wolffish fixed gear restriction areas during FY2010.

Port	Gross revenue
Chatham, MA	$ 987,221
Grand Total	$ 987,221

Table 102 - Proportion of total kept catch by species on observed trips inside wolffish fixed gear restriction areas.

Species	Observer	VTR
cod	$ 15,171	$ 569,891
haddock	$ 544	$ 31,536
flats	$ 215	$ 1,922
pollock	$ 1,406	$ 90,069
white hake	$ 0	$ -
skates	$ 10,011	$ 147,875
other	$ 4,468	$ -
squids	$ -	$ 145,927
Grand Total	$ 31,816	$ 987,221

SNE/MA Winter Flounder:

If adopted, this option would require the use of selective trawl gear in specified trawl SNE winter flounder AM areas. Only a portion of the revenues taken from inside the AM areas will be affected by this option, as vessels may still elect to fish inside the areas with selective gear. Selective gears have not been used extensively in these areas thus far, indicating that it is generally more profitable to fish with traditional gears. Whether it will be more profitable to fish in other areas or to continue fishing inside these areas with selective gears depends on the profitability of other fishing options. Given the relatively small size of these areas, the additional trip costs (steaming time, etc) are likely negligible. The true cost will be the difference between the profitability of fishing inside these areas with selective gears and the profitability of making those trips in the next best outside area. In FY 2011 trawl vessels generated $566K in gross revenues from trips reported to take place inside the AM areas. Catch rates for areas immediately adjacent to the AM areas are not likely to be substantially different than rates inside the areas. Selective gear use in other AM areas has been shown to enhance and not degrade tow-level catch efficiency. Therefore, the overall economic impact of this AM option is likely to be neutral to slightly negative. Negative impacts are likely to be little more than the cost of re-rigging, in cases where vessels do not already possess selective trawl gears.

7.4.3.6.4 Option 4: Modifications to the Accountability Measures for SNE/MAB Windowpane Flounder *(Preferred Alternative)*

Option 4 would only be adopted if the modification to the SNE/MAB ACL proposed in Section 4.1.2.3 is also adopted. Under this option, the area-based AM would go into effect if total ACL is exceeded by an amount that is more than the management uncertainty buffer, but would only affect the fisheries that exceeded their sub-ACLs. If the groundfish sub-ACL is not exceeded but the other sub-components sub-ACL is, then the AM would apply to all other trawl vessels fishing with a mesh size of 5 inches or greater. This option would minimize the cost to the groundfish fishery resulting from AMs in the event of an ACL overage caused by the other sub-components of the windowpane flounder fishery and vice versa.

By distributing responsibility for overages across the groundfish and other sub-components fisheries, Option 4 is expected to increase the effectiveness of the AM. This will help prevent overfishing, which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land windowpane flounder.

7.4.3.6.5 Option 5: Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

Option 5 would revise the accountability measures for HA and HB permits, exempting common pool vessels using handgear or tub trawls from trimester TAC provisions for white hake. This will lower the costs of an overage to these permit holders by not restricting their ability to fish for other target species when AMs are triggered. Assuming catch levels by these permit holders remain below 1% of total common pool white hake landings, exempting them from trimester TACs will have little negative economic impact in terms of overfishing.

7.4.3.7 Trawl Gear Stowage Requirements

7.4.3.7.1 Option 1: No Action

Under option 1, trawl gear stowage requirements would remain unchanged. There are no economic impacts expected.

7.4.3.7.2 Option 2: Removal of Stowage Requirements *(Preferred Alternative)*

Option 2 would remove the trawl gear stowage requirements for groundfish trawl trips. The impact of covering nets with tarps when transiting closed areas has very little pecuniary cost and is assumed not substantial enough to alter navigational course, so this option is expected to have very little economic impact. It will, however, have a positive impact on the safety of fishermen, especially in rough sea conditions. There may be a slight cost to the Coast Guard resulting from increased difficulty in assessing whether or not a vessel is fishing in a closed area. By removing gear stowage requirements it could cause the Coast Guard might need to have to repeat flyovers in order to observe trawl gear in use. VMS provides indication of when vessels are in a closed area but only average speed is calculated between VMS polls causing a delay in the notification of possible fishing activity (VMS/Enforcement meeting Sheraton Harborside Portsmouth, NH, 2011). Since VMS cannot explicitly determine whether or not a vessel is actively fishing, trawl gear stowage requirements still have some value in terms of monitoring, though the impact to fishermen safety may not justify their continuance.

7.5 Social Impacts

7.5.1 Introduction

The consideration of the social 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 agency of the federal government 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)). Social science analysis is required by multiple sections of the MSA. Section 303(b)(6) on limited entry requires examination of "(A) present participation in the fishery, (B) historical fishing practices in, and dependence on, the fishery, (C) the economics of the fishery, (D) the capability of fishing vessels used in the fishery to engage in other fisheries, (E) the cultural and social framework relevant to the fishery and any affected fishing communities, and (F) any other relevant considerations." Section 303A provides guidelines for implementing social and economic components of Limited Access Privilege Programs (LAPPs). Section 303(a)(9) on preparation of Fishery Impact Statements notes they "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." National Standard 8 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 *et seq*.). A fishing community is then defined as being "substantially dependent on or substantially engaged in the harvest 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)).

The need to measure, understand and mitigate the social impacts of fisheries policy is an essential part of the management process. Managers have an obligation to consider how policy changes affect the human context of the fishery, including the direct and indirect impacts on the safety, wellbeing, quality of life, fishery dependence, culture and social structure of communities. These impacts can be felt at the individual, family and community level which can make measuring and considering them difficult as the impact variables are typically differentially distributed. There is general consensus however, as to the types of impact to be considered; the section of the human environment where the impacts may be felt; likely social impacts; and the steps to enhance positive impacts while mitigating negative ones (ICPGSIA, 2003).

Broadly defined, social impacts that need to be considered are the "social and cultural consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society" (Burdge and Vanclay 1995). Identifying possible social impact variables is a topic of much debate but the development of standard definitions for a set of the most common and consequential social impacts is underway. The current National Marine Fisheries Service "Guidelines for Social Impact Assessment," provides some assistance in defining relevant social factors/variables. It is suggested that the following five social factors/variables should be considered when comparing the preferred management alternative to the alternatives not selected:

1. The *Size and Demographic Characteristics* of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force 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 behavior of fishermen on the fishing grounds and in their communities.
3. The effects of proposed actions on *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities.
4. The *Non-Economic Social Aspects* of the proposed action or policy; these include life-style issues, 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)

Longitudinal data describing these social factors region-wide and in comparable terms is limited, though the new surveys currently being implemented will begin to alleviate this. For this framework the "guidelines" document provides a range of variables to consider when predicting potential social impacts. It should also be noted that the academic literature on the subject has provided multiple lists of potential social variables, but it also cautions that such lists should not be considered "exhaustive" or "a checklist" (ICGPSIA, 1994; Vanclay, 2002; Burdge, 2004). Ultimately judgment must be used in choosing which variables are salient in any particular case.

Social factors specific to the Northeast (NE) Multispecies fishery and used in the Social Impact Assessment (SIA) of Amendment 13 to the FMP were previously developed using a participatory process during a series of ten "social impact informational meetings" in 2000. Based on comments provided by local stakeholders during these meetings five social impact factors were developed to describe the level of impact felt by fishing communities and families because of management changes: 1) regulatory discarding; 2) safety; 3) disruption in daily living; 4) changes in occupational opportunities and community infrastructure; and 5) formation of attitudes. These factors, while broad, overlap with those variables suggested by NMFS guidelines and have the added benefit of reflecting specific concerns of fishermen in the multispecies fishery.

In the preparation of this document, qualitative and quantitative methods have been used to assess the relative impact of the proposed management measures. Ports most closely involved with the multispecies fishery, and likely to be affected by the proposed measure, were identified during the Amendment 13 social impact informational meetings, as well as more recently with the sector year end reports. While some management measures tend to produce certain types of social impacts, it is not always possible to predict precise effects when there are multiple overlaying management measures, such as in this proposed action. Also changes to the human environment often occur in small, incremental amounts and the character of a particular impact can be hidden by the gradual nature with which it occurs. Such impacts will be noted where possible to discern, or where the potential for cumulative impacts seems likely. Therefore, the discussion of social impacts for alternatives will indicate the likely directional impacts of specific measures e.g., positive, negative, or neutral.

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

7.5.2.1 Revised Status Determination Criteria for GOM Cod, GB Cod, SNE/MA Yellowtail Flounder, and White Hake

7.5.2.1.1 Option 1: No Action

Adoption of the No Action alternative would mean the status determination criteria (SDC) for the two cod stocks, SNE/MA yellowtail flounder, and white hake would be the same criteria adopted in Amendment 16. At the time this Framework was drafted only the SNE/MA Yellowtail flounder targets had been revised and the changes in the biomass targets for the two cod stocks and white hake will not be known until the relevant assessments are completed. The Council will consider a range of values when selecting alternatives.

If the No Action alternative is selected, the primary effect would be to maintain the biomass targets established based on the GARM III assessment for the stocks in question. In the short term, using the biomass targets established by the old assessment would likely result in few, if any, social impacts. However, since new benchmarks assessments will be completed for these stocks before this action is implemented, and as part of those assessments new SDCs were determined, the use of the old values would not constitute the best available science. The continued use of SDCs based on the GARM III assessment under No Action, would result in an allocation of the SNE/MA yellowtail flounder stock that will exceed F_{msy}. In the long term, the continued use of the SDCs based on the GARM III assessment will have negative social impacts because stocks would be expected to continue to decline.

7.5.2.1.2 Option 2: Revised Status Determination Criteria for GOM Cod, GB Cod, SNE/MA Yellowtail Flounder, and White Hake *(Preferred Alternative)*

This option adopts the SDC recommended by the upcoming assessments for the GOM cod, GB cod, and SNE/MA yellowtail flounder stocks in 2012 and the White Hake species in 2013. The Council is reviewing a range of values since the assessments will not be completed until after the final vote on this action.

Compared to the No Action alternative, the most substantial effect of this alternative will be to change the allowable catch levels for the individual stocks. This SDC change will lower catch levels (at least for SNE/MA yellowtail) compared to Option 1/No Action, and will likely create restrictive catch limits for a number of sectors fishing these species. In the near term the lower catch levels will limit the amount of overall fish available to the fishery, but in the long-term the revised status determination criteria is more likely to achieve sustainable stock levels. In the near term, adopting Option 2 and the lower catch levels would lead to negative social impacts related to the *Size and Demographics*, and *Historic and Present Participation* of the fishery, particularly with respect to changes in income, employment opportunities and disruptions to fishing practices. The near term negative effects of Option 2 will likely be outweighed by the long term positive social impacts associated with sustainable biomass targets.

Although the Revised Status Determination Criteria in Option 2 is based on the best available, and most recent, science; it may have a small negative effect on the A*ttitudes, Beliefs and Values* of fishermen about the management process. Because of the sizable changes compared to the previous assessments, the recent assessments on which the SDC are based have been met with some skepticism from certain groups. The apparent inconsistency between the two models will have a negative social impact, undermining the perceived legitimacy of current and future management actions. Among fishermen in the northeast, there is general distrust of the science behind NMFS stock assessments. In a 2008, a survey of NE fishermen found that 68% disagreed with the statement; “I have faith in the quality of federal science” (Acheson and Gardener, 2011).

7.5.2.2 SNE/MA Windowpane Flounder Sub-ACLs

7.5.2.2.1 Option 1: No Action

If the No Action alternative is adopted, there will be no additional sub-ACLs adopted for SNE/MA windowpane flounder. The potential social impacts associated with the adoption of the No Action alternative are small but mostly negative.

Adopting the No Action alternative would cause a negative social impact by reinforcing the *Attitudes and Beliefs* that the distribution of SNE/MA windowpane catch and responsibility is unfair. The allocation of some portion of the SNE/MA windowpane ACL to the “other sub-component” of the fishery would be maintained, but would continue to hold the groundfish fishery accountable for any overages to the total ACL. The perceived inequity could also cause resentment or conflict between fishing groups, another negative social impact in the form of changes to *Social Structures and Organizations*.

7.5.2.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL *(Preferred Alternative)*

The adoption of Option 2 would allocate a portion of the SNE/MA windowpane flounder ACL to the scallop fishery to account for incidental catches in that fishery. Previously, allocations of SNE/MA windowpane to the scallop fishery were considered part of the “other sub-component” and were not subject to any specific scallop fishery AMs. From 2001 to 2010, it is estimated that the scallop fishery has caught an estimated average of 21.7% of the SNE/MA windowpane yearly catch. Option 2 would allocate to the Scallop fishery 36% of the total ACL based on the 90th percentile of scallop fishery catches, 2001 – 2010. AMs for the scallop fishery and this sub-ACL would be adopted in a future scallop management action during 2013. Option 2 woulddistribute the catch of SNE/MA windowpane flounder differently than has been done in the past, which may cause a range of social impacts, differentially distributed, on the multispecies and scallop fleets.

Communities and individuals that have a greater dependence on the scallop fishery, compared to the multispecies fishery, may experience some small but negative social impacts associated with Option 2. A new, scallop specific, sub-ACL and AM could be seen as somewhat restrictive and may affect the *Historic and Present Participation* if the sub-ACL is set at a level substantially different than the historic catch. Option 2 could also exacerbate conflict between the scallop and groundfish fisheries over the issue of the scallop fishery’s groundfish takes, negatively affecting the *Social Structures and Organizations* of a community. If a scallop specific AM is triggered due to a scallop sub-ACL overage, the *Size and*

Demographics of the scallop fishery could be negatively affected as the AM could limit future fishing opportunity.

Compared to the No Action alternative, it is likely that Option 2 would provide positive social benefits for individuals and communities involved in the multispecies fishery. The reallocation of sub-ACL from the “other sub-component” to a specific scallop sub-ACL with a scallop specific AM, will have a positive influence on the *Attitudes and Beliefs* among groundfish fishermen. The scallop specific sub-ACL and the associated AM will be perceived by groundfish fishermen as a more equitable distribution of both fishing rights and responsibility. Compared to the No Action alternative the scallop specific sub-ACL in Option 2 would provide some measure of security to the multispecies fishery that total ACL is less likely to be exceeded, because of the additional AM associated with the scallop sub-ACL. This could reduce uncertainty in an individual’s future planning of fishery operations, which would have a positive effect on the *Life-style/Non-economic social aspects* of the fishery.

7.5.2.2.3 Option 3: Other Sub-Components Sub-ACL *(Preferred Alternative)*

If Option 3 is adopted a portion of the SNE/MA windowpane flounder stock would be allocated to the other sub-components in federal waters and treated as a sub-ACL. This is an administrative measure that allows the adoption of an AM for catches made by other fisheries. This measure is not expected to have any additional social impacts beyond those described in social impacts section of the proposed AM.

7.5.2.3 Scallop Fishery Sub-ACL for Georges Bank GB Yellowtail Flounder

7.5.2.3.1 Option 1: No Action

Adoption of the No Action alternative would cause no changes to how the scallop fishery sub-ACL for GB yellowtail flounder is determined. This option would offer the most flexibility in the consideration of future allocations of GB yellowtail flounder to the scallop fishery but it would also offer the greatest potential for variation in allocations. Option 1 is not expected to have any substantial social impacts because it does not set any allocations that would act on individuals and fishing communities. Some small negative social impacts could be associated with this option because it maintains some year to year uncertainty in determining allocations, which could affect both the scallop and groundfish fisheries. During the 2000 groundfish social impact meetings, uncertainty about regulations and the future of the groundfish fishery was repeatedly identified as a serious social impact that can make both business and household planning difficult.

7.5.2.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified as 90 percent of the Estimated Catch

If Option 2 is adopted, on an annual basis, the scallop and groundfish PDTs would estimate the amount of GB yellowtail flounder the scallop fishery is expected to catch and then base the following year’s GB yellowtail sub-ACL on 90% of the estimated sub-ABC. This option would adopt a standard approach for allocating GB yellowtail to the scallop fishery that could be adjusted based on relevant data and without a specific Council action.

Compared to Option 1, Option 2 provides some measure of certainty in the method that would be used to allocate the scallop fishery its GB yellowtail flounder sub-ACL. This certainty would have a small positive social impact because it would allow both the groundfish and scallop fisheries to plan future harvests with greater confidence. There remains a question of how equitable the scallop sub-ACL based on 90% of the sub-ACL will be perceived by both fisheries, as individuals from either may feel unfairly constrained by the other. The sub-ABC estimation method used in Option 2 is based on the expected catch and it is not directly based on the health of the GB yellowtail stock. There could be a situation where the estimated scallop catch of GB yellowtail is expected to be large while the total ABC is small; the scallop sub-ACL based on 90% of that catch could comprise a disproportionately large part of the ABC. This would severely limit available allocations of GB yellowtail to the groundfish and other sub-components causing negative social impacts on the *Historic and Present participation* in the groundfish fishery; as well as impacts to *Social Structures and Organizations* because of fishing group conflicts. These potential social impacts are likely to vary over time because they are dependent on the final allocations of GB yellowtail and how constraining those allocations will be.

7.5.2.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History *(Preferred Alternative)*

Adopting Option 3 would set the scallop fishery's sub-ACL for GB yellowtail flounder as a fixed percentage of the U.S. ABC. The groundfish committee's preferred alternative, based on recent catch history, recommends that the scallop fishery's sub-ACL for GB yellowtail flounder be 16% of the U.S. ABC.

Compared to the No Action alternative, Option 3 offers the most positive and least negative social impact. Option 3, like Option 2, would provide some certainty in the method GB yellowtail sub-ACL is allocated, which will allow both the groundfish and scallop fisheries more confidence in future harvest plans. This option is also the most equitable. For the last ten years (2002 – 2011) the scallop fishery has caught an average of 7.1% and a range from 0.9% - 16.1% of the total GB yellowtail catch. A sub-ACL which is 16% of the ABC will be consistent with historic catches but will also depend on the relative health of the GB yellowtail stock. There are a number of potential social impacts that are dependent on the final allocations of GB yellowtail and how constraining those allocations will be. However, because the allocations would be proportional, the impacts will be evenly distributed across fisheries.

7.5.2.4 Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

7.5.2.4.1 Option 1: No Action

Adoption of the No Action alternative would not cause a specific sub-ACL for GB yellowtail flounder to be created for the small-mesh bottom trawl fisheries. Under this option, the catch of GB yellowtail flounder made by small-mesh bottom trawl fisheries would be considered part of the other sub-components category. Option 1 is not expected to have any substantial social impacts because it does not set any allocations that would act on individuals or fishing communities. Some small negative social impacts could be associated with this option because it maintains some year to year uncertainty in determining allocations which could affect the other sub-component fisheries and the groundfish fishery. Uncertainty about regulations and the future of the groundfish fishery is a serious social impact that can make both business and household planning difficult.

7.5.2.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder *(Preferred Alternative)*

If Option 2 is adopted a sub-ACL, specific to the small-mesh bottom trawl fisheries would be created as a fixed percentage of the U.S. ABC. Based on recent catch history, the small-mesh bottom trawl fisheries' sub-ACL for GB yellowtail flounder would be between 2% and 4% of the U.S. ABC, adjusted for management uncertainty.

Compared to the No Action alternative, Option 2 offers some small positive social impact. Option 2, would provide certainty in the GB yellowtail sub-ACL allocated to the small-mesh bottom trawl fisheries, which would allow those fisheries more confidence in future harvest plans. Since 2004, the small-mesh bottom trawl fisheries have caught an average of 3% and a range from 1% - 7% of the total GB yellowtail catch. A sub-ACL between 2% and 4% of the ABC will be consistent with historic catches and having a separate sub-ACL will reduce possible conflicts within the other sub-component. There are a number of potential social impacts that are dependent on the final allocations of GB yellowtail and what AMs any overages might trigger.

7.5.3 Commercial and Recreational Fishery Measures

7.5.3.1 Management Measures for the Recreational Fishery

7.5.3.1.1 Option 1: No Action

If the No Action alternative was adopted, there would be no change to the administration of recreational AMs. This option would retain the reactive trigger of an AM only after the sub-ACL has been exceeded. Social impacts stemming from this option would likely be negligible, as this option maintains the status quo administration of recreational AMs. However, if a lack of flexibility in the management of the recreational AMs compromises achieving OY, this could result in negative social impacts over the long-term. Because the No Action alternative would not allow for proactive changes to the recreational measures, it will continue to be difficult to ensure that the recreational catch will achieve but not exceed the sub-ACL. Failing to reach the sub-ACL negatively impacts the social and economic components of OY, but is positive or neutral for the biological component. Exceeding the sub-ACL is negative for the biological component but in the short-term it could be positive for the social and economic components. If the recreational catch consistently fails to achieve or exceeds the sub-ACL, this could compromise the overall management goal of reaching OY.

7.5.3.1.2 Option 2: Revised Measures *(Preferred Alternative)*

Under Option 2, NMFS and the Council would be able to proactively adjust the recreational accountability measures if it is expected that the recreational fishery will exceed or not achieve the sub-ACLs of recreational stocks. This option, in and of itself, would cause only negligible social impacts because it is an administrative change affecting when and how changes to recreational measures will be triggered, though there would ultimately be social benefits to more closely achieving OY.

Compared to the No Action alternative, Option 2 modifies the accountability measures so that the recreational fishery can more reliably achieve the target sub-ACLs, and by extension OY. Social benefits would be expected to be commensurate with the gains in reliably achieving the sub-ACL and OY. By allowing for mid-season adjustments to the recreational measures, Option 2 would also introduce uncertainty into how recreational fishermen are able to plan their fishing. Uncertainty in what recreational measures would be in the coming year could have a small but negative impact on *Historic and Present Participation*, through disruptions to fishing practices, as well as, *Life-style/Non-economic social aspects* from decreased recreational satisfaction.

7.5.3.2 Groundfish Monitoring Program Revisions

7.5.3.2.1 Option 1: No Action

Adopting the No Action alternative would maintain current program goals, objectives and coverage levels for the monitoring of the groundfish fishery set by Amendment 16. This would include the cost recovery of expenses related to ASM and DSM. This action, which is largely administrative, is not expected to have any substantial social impacts on the communities and individuals involved in the fishery, as it maintains the status quo administration of the groundfish monitoring program.

If Option 1 is adopted and groundfish vessels are required to cover the cost of monitoring, it is expected that there will be negative social impact associated with this action. The economic section of this document describes some of the expected losses and gains in revenue related to this alternative and the social impacts will, for the most part, reflect the expected change in revenue. Changes in revenue tend to have a social impact on the *Size and Demographic Characteristics* of the fishery in the form of crew income and employment opportunities, as well as income to the vessel owner. The other elements of this alternative are largely administrative and they are not expected to have any substantial social impacts on the communities and individuals involved in the fishery as they maintain the status quo administration of the groundfish monitoring program.

7.5.3.2.2 Option 2: Monitoring Program Goals and Objectives *(Preferred Alternative)*

If Option 2 is adopted, the groundfish monitoring program goals and objectives will be expanded and revised to be more explicit, setting design and evaluation specifications. By setting more specific goals and objectives for the monitoring program, Option 2 allows for more targeted program revisions in the future.

Like the No Action alternative, Option 2 is not expected to have any substantial social impacts. Although Option 2 expands the goals and objectives of the monitoring program, these are administrative changes that do not act on communities or individuals involved in any perceptible way. Some small positive social impacts may be experienced by those that see Option 2 as addressing inadequacies with the current program. Option 2 could generate positive social impacts to the formation of *Attitudes and Beliefs* by providing goals and objectives that lead to a more accurate and cost effective monitoring program.

7.5.3.2.3 Option 3: ASM Coverage Levels

Sub-Option A: *(Preferred Alternative)*
Sub-Option A would clarify what level of stratification should be used for the coefficient of variation (CV) standard. Of the two standards considered, Sub-Option A1 would require the CV standard to be met at each overall stock level; while Sub-Option A2 would require the CV standard be met at the stock level for each sector. Currently, ASM coverage levels are consistent with sub-option A1 where the CV standard must be met at the stock level. Neither Sub-Option A1 or A2 would require that the CV standard be met for each stratum within a sector.

If the Sub-Option A1 ASM coverage level of the Option 3 alternative is adopted, the current level of observer/ASM coverage would remain the same. Current coverage levels based on a target CV standard of 30% is considered by some to be insufficient to monitor, enforce and regulate a fishery that is governed by Annual Catch Limits/Hard TAC's (McAllister, 2007). In 2007, when ASM coverage levels were based on a CV standard of 30%, a survey of fishermen, managers and scientists in the Northeast (NE) found that fishing violations were only expected to be detected 32.5% of the time and illegal/unreported fishing was estimated at 12 – 24% of the total harvest. The same survey found 38% of NE fishermen felt that the adverse effects of illegal/unreported fishing and the failure to effectively monitor the resource were enough to prevent them from ever benefiting from stock rebuilding programs (King and Sutinen, 2010). Given the low opinion of an ASM coverage level based on a CV standard of 30%, maintaining that same coverage level could cause a small negative social impact with regard to the formation of *Attitudes and Beliefs*.

If the Sub-Option A2 ASM coverage level was adopted, ASM coverage would increase to a level sufficient to meet the CV standard at the stock and sector levels. Increasing the ASM coverage would allow for more accurate monitoring of catch and discards, which would provide some small positive social impacts with regard to the formation of *Attitudes and Beliefs* about government and management. However, it is also likely that increased ASM coverage would lead to negative social impacts with respect to fishermen's *Historic and Present* participation and *Life-style/Non-economic social aspects* of the fishery. Carrying an observer on a fishing trip is generally thought of as an inconvenience, causing disruption in fishing practices and creating a social environment in which fishermen feel spied upon and never at their ease. Fishermen have also voiced complaints that observers, some of whom are inexperienced with working at sea, can pose a safety concern, leading to negative social impacts.

Sub-Option B: *(Preferred Alternative)*
Sub-Option B would remove the requirement for industry-funded At-Sea Monitoring for FY 2013. The fishing industry is currently scheduled to take over cost responsibility in FY 2013 but under this option NMFS will provide the funding of ASM for sector trips in FY 2013. If Sub-Option B is adopted, it would have a positive social impact on individuals and communities involved in the groundfish fishery. Sub-Option B would reduce the expected operating costs of sectors in FY 2013 which will have a positive impact on the *Size and Demographics* of, and the *Historic and Present participation* in the fishery.

Sub-Option C: *(Preferred Alternative)*
Sub-Option C offers two possible ASM coverage rates for vessels fishing on a monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear, which would be lower than the performance standard coverage level set by FW48. Sub-Option C1 would set a new coverage rate determined by NMFS for trips on monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear. Sub-Option C2 would remove the requirement for ASM coverage on these trips and would retain NEFOP observer coverage only.

If Sub-Option C1 is adopted, ASM coverage on trips using monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear would decrease to some new level set by NMFS. A decrease in ASM coverage would have a positive social impact with respect to fishermen's *Historic and Present* participation and *Life-style/Non-economic social aspects* of the fishery. Carrying an observer on a fishing trip is generally thought of as an inconvenience, causing a disruption in fishing practices and creating a social environment in which fishermen feel overly scrutinized. Reducing the level of ASM and scrutiny would then lessen these disruptions. Furthermore, trips of this type have caught relatively small amounts of groundfish. A redistribution of ASM coverage, away from these trips could be seen as a more practical use of ASM funds. Most vessels that make trips of this type hail from the port community of Barnegat Light, NJ and it would be expected that the positive social impacts associated with Sub-Option C1 would be localized there.

If Sub-Option C2 is adopted, vessels on trips using monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear, would no longer be required to carry an observer. Sub-Option C2 would be expected to have similar but greater social impacts as Sub-Option C1, as it would also lower ASM coverage on these trips but to a greater extent. There is some concern that free of all ASM coverage, vessels on these trips could catch groundfish species and that this catch would go undocumented. This could lead to resentment among members of other fishing groups, if they feel unfairly burdened by the responsibility of monitoring. If the distribution of ASM coverage is seen as benefiting a particular segment of the fishery at the expense of another, this could have a negative social impact on *Social Structures and Organizations* through fishing group conflicts.

7.5.3.2.4 Option 4: Industry At- Sea Monitoring Cost Responsibility *(Preferred Alternative)*

Option 4, if adopted, would outline the extent to which the fishing industry would be responsible for the cost of ASM coverage. Specifically, the fishing industry would only ever be responsible for contributing to the daily salary costs of ASMs. Option 4 does not stipulate whether industry would be responsible for ASM costs in a given year, only that industry would not be accountable for the administrative costs of the monitoring program. This option would likely cause some negligible small but positive social impacts because it offers an assurance as to the limitation of ASM cost recovery.

7.5.3.3 Dockside Monitoring Requirements

7.5.3.3.1 Option 1: No Action

If the No Action alternative is adopted, dockside monitoring coverage levels in FY 2013 would return to those set in Amendment 16 and modified by Framework 45. Coverage would focus on trips that did not carry an observer with at least 20 percent of trips in each sector and 20% of common pool trips being monitored. As a result, landings from these trips reported in dealer reports and vessel logs will be independently verified providing more accurate reporting.

Option 1 would essentially raise DSM coverage levels because FW 45 had removed the DSM requirement for sectors in FY 2011 and for all vessels in FY 2012. Increasing DSM will have a negative social impact with regard to the *Size and Demographics* of the fishery, as industry funded DSM will increase overall operating costs. Increasing DSM could offer some slight long-term social benefit, as it will increase the accuracy monitoring and by extension, the legitimacy of future management decisions.

7.5.3.3.2 Option 2: Elimination of Dockside Monitoring Requirement *(Preferred Alternative)*

If Option 2 was adopted, there would be no DSM requirements in FY2013. This Option would maintain the current level of no DSM, as FW 45 eliminated the DSM requirement in FY2012.

Compared to the No Action alternative, Option 2 would remove the industry funded dockside monitoring requirement in FY 2013, which would decrease the operating costs of sectors. Option 2 would provide a positive social impact, insomuch as it would help reduce or maintain current operating costs. Landings information obtained by using DSM is already provided through the dealer reporting system, so Option 2 would avoid redundant catch accounting. Dockside monitors do however provide a way of confirming and supporting the information in dealer reports and vessel logs, which if the DSM requirement is removed, could affect the accuracy of landings data. If the accuracy of landings data is compromised by a lack of DSM, Option 2 could have a long-term negative impact on the *Historic and Present Participation* in the fishery because of management would be based on misrepresented landings.

7.5.3.4 Commercial Fishery Minimum Size Restrictions

7.5.3.4.1 Option 1: No Action

If the No Action alternative is adopted, there would be no revision to the regulations regarding landings of the allocated groundfish currently managed (Table 8). The original intent of the minimum landed size limits was to direct fishing effort away from populations of sub-adult fish, as well as to reduce the incentive to use illegal mesh, thereby providing opportunities for undersized fish to spawn before harvest. Maintaining the current minimum landed size for the allocated groundfish species would result in a similar level of discarding of undersized fish as in recent years.

During the social impact informational meetings prior to Amendment 13, fishermen identified regulatory discarding as a particularly distasteful social impact. Having to throw marketable, valuable and oftentimes dead fish overboard as a result of regulations has a negative impact on the *Life-style/Non-economic social aspects* of fishing. Under current catch share management, regulatory discarding of marketable fish is made even more distasteful because a sector's catch (not their landings) is deducted from its fixed allocation. For those fishermen operating under sectors, the discarding of undersized but marketable fish not only represents a loss of revenue but is also a reduction of the season's future fishing opportunities. If the No Action alternative is adopted, it is likely that the status quo level of discarding will continue and the negative social impacts to *Life-style/Non-economic social aspects* of fishing will remain the same.

7.5.3.4.2 Option 2: Changes to Minimum Size Limits *(Preferred Alternative)*

If Option 2 is adopted, the minimum size limits for many groundfish species would be reduced (Table 9). The intent is not to encourage the targeting of smaller fish but to have fishermen retain fish at sizes they would have had to discard previously. Furthermore, common pool vessels would be subject to these minimum sizes, but because common pool vessels are regulated by trip limits and DAS, these vessels would not be required to land all legal-sized fish.

Compared to the No Action alternative, Option 2 would have a positive social impact on the *Life-style/Non-economic social aspects* of fishing, by reducing regulatory discards. For those operating in a sector, they could more fully realize their ACE by landing marketable fish that were undersized in the Option 1 (No Action) size limit. The opportunity to land previously discarded fish would have a positive social impact on the *Size and Demographics* with respect to incomes and employment opportunities.

7.5.3.4.3 Option 3: Full Retention

If Option 3 wass adopted, all sizes of allocated groundfish species must be retained by sector vessels. Common pool vessels would still be subject to minimum sizes, but because common pool vessels are regulated by trip limits and DAS these vessels would not be required to land all legal-sized fish. Option 3 is being considered because the full retention of allocated groundfish species by sector vessels would facilitate a reduction in monitoring costs through the possible use of electronic monitoring systems.

Compared to Option 1, the No Action alternative, Option 3 would have a positive social impact on the *Life-style/Non-economic social aspects* of fishing, by reducing regulatory discards. For those operating in a sector, 100% of their ACE would be realized by landing marketable fish that were undersized in the Option 1 (No Action) size limit. Because Option 3 requires the retention of all allocated species, including unmarketable fish that are too small or are damaged, Option 3 could cause a negative social impact with regard to the *Historic and Present participation.* Vessel operators will have to land unmarketable fish which will disrupt the normal fishing practices at sea and will require a plan for dealing with the unmarketable fish once they return from a trip.

7.5.3.5 GB Yellowtail Flounder Management Measures

7.5.3.5.1 Option 1: No Action

Adopting the No Action alternative, would maintain the existing measures for GB yellowtail flounder. Sector and common pool vessels would continue to be able to land the stock according to sector allocations or common pool regulations. Limited access scallop vessels would still be required to land all legal sized yellowtail flounder and General Category scallop vessels would still be prohibited from retaining any yellowtail flounder.

Under Option 1, the estimation of GB yellowtail flounder discards for the purposes of groundfish quota monitoring would still be attributed to fishing that occurs in a single area that matches the existing boundaries for the stock. There would also be no specific gear requirements for small-mesh bottom trawl vessels fishing in the GB yellowtail flounder stock area.

Option 1 would maintain the status quo measures for GB yellowtail flounder, with regard to how GB yellowtail discards are calculated and the gear requirements of small-mesh bottom trawl vessels fishing in the GB yellowtail flounder stock area, giving vessels the opportunity to land the stock and the flexibility to target the stock how they choose. Social impacts of the No Action alternative would be negligible, as Option 1 continues to use the current method of accounting for discards on unobserved trips. Low allocations and the possibility of exceeding catch levels of GB yellowtail flounder combined with broad area discard estimations could cause anxiety and uncertainty among fishermen, having a negative impact on the *Life-style/Non-economic social* aspects of the fishery. Furthermore, in the face of low allocations of GB yellowtail flounder, adopting the No Action alternative could be viewed as not doing enough to prevent potential overages to the total ACL, leading to a negative social impact on Attitudes and Beliefs with respect to perceptions of government/management.

7.5.3.5.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder *(Preferred Alternative)*

If Option 2 is adopted, the stratification method used for estimating discards of GB yellowtail flounder would be modified such that trips made in Statistical Area 522 would have a different calculated discard rate than the rest of GB. Conceivably, catch and discard rates of GB yellowtail flounder will be lower in SA 522 than the rest of GB, allowing for more fishing in SA 522 with a lower risk of exceeding allocations of GB yellowtail flounder. It is important to point out that because the GB discard rate is calculated based on observed hauls in the GB statistical areas, removing hauls with low yellowtail discards made in one area will inflate the calculated discard rate in the other areas. Removing observed hauls with low yellowtail discards made in SA 522 from the hauls used to determine the GB discard stratum, will increase the yellowtail discard rate assigned to the other GB statistical areas. It is possible that the fishing opportunities gained in SA 522 will come with a loss in opportunity in the other GB statistical areas because of higher calculated discard rates.

Compared to the No Action alternative, Option 2 would offer some small but positive social impacts. It is likely that the perception among fishermen would be that Option 2 of this measure would provide some assurance that vessels fishing in SA 522 would not be penalized by the higher discard rates found in other stock areas. This would have a small but positive social impact on the formation of *Attitudes and Beliefs* about government and management. Other potential social impacts of adopting Option 2 over the No Action alternative are difficult to predict because they will vary based on the calculated discard rates in SA 522 and the other GB stock areas, as well as based on the distribution of fishing in those areas.

7.5.3.5.3 Option 3: Small-Mesh Fishery Bottom Trawl Gear Requirements

Adopting Option 3 would require bottom trawl vessels using small-mesh gear that are on non-groundfish trips in SA 522, 525, 561, and 562, to use a trawl gear designed to minimize the catch of flatfish.

This option would have a negative social impact on the communities and operators of vessels participating in these fisheries. In 2011, about 22 vessels using small-mesh gear fished in SA 522, 525, 561, and 562 out of 229 vessels used this gear on a non-groundfish trip. A new gear restriction would cause a disruption in fishing practices and an increase in operating costs, which would have a negative impact on the *Historic and Present participation* in these fisheries. However, these impacts will likely only affect a subset of communities and operators of vessels that use small-mesh bottom trawl gear on non-groundfish trips. For the past four years (2008 – 2011), vessels using small-mesh gear on non-groundfish trips in SA 522, 525, 561, and 562 have had homeports in either Point Judith, RI or Montauk, NY and social impacts would be expected to concentrate in these communities. These are relatively large and diverse fishing communities, so while individuals may experience some negative social impact from Option 3, broader community impacts are less likely to be felt.

Adopting Option 3 would have some small, diffuse positive social impact on individuals and communities involved in fisheries that catch GB yellowtail. By reducing the catch of GB yellowtail and other GB flatfish made by vessels using small-mesh bottom trawl gear on non-groundfish trips, this allows for more these fish to be caught by other fisheries. Option 3 would effectively cause a slight increase in the amount of GB yellowtail available to the groundfish, scallop and other sub-components which could reduce the potential for conflict over the distribution of a limiting resource.

7.5.3.6 Sector Management Provisions – Allowed Exemption Requests

7.5.3.6.1 Option 1: No Action

If adopted, the No Action alternative would retain the current restrictions on the types of exemptions that sectors can request. In particular, sectors would not be able to request an exemption to access year round closed areas outside of a special access program or experimental fishery.

By refusing sectors the ability to request exemptions that would allow access to current area closures, Option 1 would cause some negligible negative social impacts. These impacts would affect those members of a sector that have considered requesting an exemption for access, and would likely manifest as changes in *Attitudes and Beliefs*. When Amendment 16 was adopted, the prevailing management strategy changed from input to output controls, and sectors were given the ability to request exemptions from established management measures that limited effort. The ability to request an exemption that would allow a sector access to the non-habitat portions of a closed area was not granted, even though these closed areas were primarily adopted to help control groundfish fishing mortality. The perceived inconsistency between current management based on output controls (e.g. TACs and ACLs) and the continued use of closed areas designed as part of input control management could lead to a negative social impact on the formation of *Attitudes and Beliefs* about government and management.

7.5.3.6.2 Option 2: Exemption from Year-Round Mortality Closures *(Preferred Alternative)*

If Option 2 is adopted, sector management provisions would be modified to allow sectors to request an exemption from the prohibition on fishing in year-round closed areas, subject to the limitations outlined in Section 4.2.5.2.

Compared to the No Action alternative, the direct social impacts of Option 2 would be small but positive on the formation of *Attitudes and Beliefs* about government and management. By giving sectors the opportunity to request an exemption from an effort control where sectors are already constrained by their ACE, Option 2 allows sectors greater flexibility in their operations. Also, Option 2 would address a perceived inconsistency in the exemption process, which allows sectors to request exemptions from other controls on effort but does not allow sectors to request an exemption allowing access to non-habitat year round closed areas.

If Option 2 is adopted and sectors requesting exemptions are granted access to the non-habitat portions of the year round closed areas there could be a number of social impacts, both positive and negative. Although it is unclear what benefit accessing the year round closed areas would have in terms of sectors realizing their ACE, positive social impacts would be expected in *Life-style/Non-economic social aspects* of the fishery, as sectors would have greater flexibility in choosing where to fish. Because portions of the year-round closed areas are already accessible to other fisheries, granting a sector exemption allowing sector access to the same areas could cause fishing group conflicts and a negative social impact on *Social Structures and Organizations*.

7.5.3.7 Commercial Fishery Accountability Measures

7.5.3.7.1 Option 1: No Action

Adopting the No Action alternative would maintain the status quo administration of AMs for the commercial groundfish fishery.

Under the No Action alternative, if an AM for a non-allocated stock is triggered, the AM is delayed until year 3 instead of the following year (year 2). This management strategy ensures that an AM is not prematurely triggered by potentially unreliable data, but it also delays the AM a year when a fishery's ACL has been exceeded. The social impacts associated with this aspect of the No Action alternative are dependent on the resource situation and the general perception of the resource. In years where the resource is critically low, waiting a year to implement an AM could be seen as management being slow to act having a negative impact on the formation of *Attitudes and Beliefs* about government and management. In years where there is a perception that a resource is healthy, waiting a year to gather additional data before implementing an AM could be seen as a justifiable approach.

The No Action alternative would also leave Atlantic halibut, Atlantic wolfish and SNE/MA winter flounder without a groundfish AM. Not establishing a particular groundfish fishery AMs is not expected to have any direct social impacts on the fishery. The No Action alternative would also keep the administration of the SNE/MAB windowpane flounder AM the same, where the penalty falls on the groundfish fishery alone. If a SNE/MAB windowpane flounder AM is triggered under the No Action alternative, the AM would not apply to the "other sub-components" of the fishery, even though a large portion of the stock is caught by trawl vessels in other fisheries using mesh size larger than 5 inches. The current way in which the AM is administered could cause resentment among groundfishermen towards those in the "other sub-components" having a negative social impact on *Social Structures and Organizations* in the larger fishing community.

Under Option 1, common pool vessels with HA or HB permits using either handgear or tub trawls would still be subject to the trimester TAC AM for white hake. Because white hake is rarely caught by these vessels using handgear or tub trawls, participants in this segment of the fishery may resent being subject to the same AM. By maintaining a regulation that is perceived as misapplied, Option 1 could have a negligible but negative impact on the formation of *Attitudes and Beliefs* about government and management.

7.5.3.7.2 Option 2: Change to AM Timing for Stocks Not Allocated To Sectors *(Preferred Alternative)*

If Option 2 is adopted, the timing of AMs for non-allocated stocks would be modified so that AMs can be implemented more quickly in order to reduce the risk of overfishing in future fishing years. AMs will not be implemented after the start of a fishing year, to accommodate fishing businesses' ability to plan operations each year.

Compared to the No Action alternative, Option 2 modifies the timing of accountability measures so that if reliable information is available management may react more quickly to overages of the ACL. Some small positive social impact to the formation of *Attitudes and Beliefs* about government and management would be expected to come from the gains achieved by quickly reacting to overages of the ACL of non-allocated stocks. However, it is also possible that under Option 2, an AM could be triggered prematurely by unreliable data and that it would have been prudent to wait a year before implementing the AM. If an AM is prematurely implemented, it could have a negative impact on fishing operations as well as on *Attitudes and Beliefs* about government and management. The AMs themselves could have a small but negative impact on *Historic and Present Participation*, through disruptions to fishing practices, but by not allowing for mid-season adjustments, Option 2 would reduce uncertainty in how fishermen are able to plan their fishing.

7.5.3.7.3 Option 3: Area – Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder *(Preferred Alternative)*

If Option 3 is adopted, it would establish groundfish fishery AMs for Atlantic halibut, Atlantic wolfish and SNE/MA winter flounder to be triggered if the total ACL is projected to be exceeded by an amount that exceeds the management uncertainty buffer. The AM for Atlantic halibut would be comprised of three gear specific areas, one trawl area requiring the use of selective gear and two areas prohibiting sink gillnet and longline use. The AM for Atlantic wolfish would be comprised of three gear specific areas, one trawl area requiring the use of selective gear and two areas prohibiting sink gillnet and longline use. The AM for SNE/MA winter flounder would be comprised of four selective trawl areas which would require the use of selective gear. Each of the AM areas for Atlantic halibut, Atlantic wolfish and SNE/MA Winter flounder is outlined in Section 4.2.6.3.

Establishing the groundfish fishery AMs is not expected to have any direct social impacts on the fishery. However, if a particular AM is triggered, it is likely that there would be some negative social impacts. If an area based AM is triggered by exceeding the total ACL of a particular species, it would cause a disruption in fishing practices. As it is intended, this AM would change where and how the groundfish fishery fishes which would have an impact on the Historic and Present participation in the fishery.

7.5.3.7.4 Option 4: Modifications to the Accountability Measures for SNE/MAB Windowpane Flounder *(Preferred Alternative)*

The adoption of Option 4 would amend the existing AM for the SNE/MAB windowpane flounder stock, to apply to both the groundfish sub-ACL and the other sub-component portion of the ACL. Currently, a large portion of the SNE/MAB windowpane flounder stock is consistently caught by the other sub-component of the ACL, but the AM only applies to the groundfish fishery. In the case of an ACL overage, the current AM for this stock may not be adequate to prevent overfishing.

Compared to the No Action alternative, Option 4 would have small positive social impacts for those involved in the groundfish fishery because it would be an equitable distribution of responsibility between the groundfish fishery and the other sub-components of any ACL overage. Communities and fishermen involved in fisheries that are part of the other sub-component could experience a disruption to their fishing practices, a social impact to the *Historic and Present participation*, if the sub-ACL is exceeded and the AM is triggered. Adopting Option 4 could also lead to fishing group conflicts between the fishing sectors within the other sub-component that feel affected and constrained by the fishing practices of other sectors. Preliminary estimates of SNE/MAB windowpane catches in 2011 show that of the other sub-component, the scallop, fluke, scup and "unknown" fisheries catch relatively large amounts of SNE/MAB windowpane. These fisheries in particular could be seen as responsible for exceeding the ACL of the other sub-component, triggering an AM.

7.5.3.7.5 Option 5: Revised HA and HB Permit Accountability Measures *(Preferred Alternative)*

If adopted, Option 5 would exempt common pool vessels with HA or HB permits using either handgear or tub trawls from the trimester TAC AM for white hake. Based on recent catches made by these vessels, white hake is rarely caught, so removing the trimester TAC AM would have little effect on fishing operations. However, by removing the white hake AM for these vessels, Option 5 would cause a small positive social impact to the formation of *Attitudes and Beliefs* about government and management among operators of common pool vessels using these gears.

7.5.3.8 Trawl Gear Stowage Requirements

7.5.3.8.1 Option 1: No Action

The adoption of the No Action alternative, would maintain the regulations that require vessels stow their trawl gear when transitioning through closed areas. If adopted, Option 1 would likely cause no or only small negative social impacts. The current requirements to stow trawl gear during transit through closed areas causes a slight negative impact, as a very minor disruption in fishing practices and the *Historic and Present participation* in the fishery. Also, with VMS on all groundfish vessels, a gear stowage requirement has become redundant enforcement. By maintaining a regulation that is perceived as outdated, Option 1 could have a small negative impact on the formation of *Attitudes and Beliefs* about government and management.

7.5.3.8.2 Option 2: Removal of Trawl Gear Stowage Requirements *(Preferred Alternative)*

Option 2 would remove the regulation requiring trawl vessels stow their gear while transitioning through the closed areas. Compared to the No Action alternative, Option 2 would provide a small positive social impact by reducing and simplifying the regulatory burden experienced by fishermen. By removing a regulation that is already being enforced/monitored by other means (i.e. VMS), Option 2 would eliminate a minor disruption in fishing practices. In the larger context of fisheries management, the removal of outdated and redundant forms of control should lead to positive gains in the perceptions of management. Adopting Option 2 would have a small positive social impact on the formation of *Attitudes and Beliefs* about government and management because of the simplification of management measures.

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 48 together with past, present, and reasonably foreseeable future actions that affect the groundfish environment. It should also be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in nature.

<u>Valued Ecosystem Components (VEC)</u>
As noted in Section 6.0 (Description of the Affected Environment), the VECs that exist within the groundfish fishery are identified and the basis for their selection is established. Those VECs were identified as follows:

1. Regulated groundfish stocks (target and non-target);
2. Non-groundfish species (incidental catch and bycatch);
3. Endangered and other protected species;
4. Habitat, including non-fishing effects; and
5. Human Communities (includes economic and social effects on the fishery and fishing communities).

<u>Temporal Scope of the VECs</u>
While the effects of historical fisheries are considered, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. For endangered and other protected species, the context is largely focused on the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, this analysis examines the period between the expected implementation of this framework (May 1, 2013) and 2018.

<u>Geographic Scope of the VECs</u>
The geographic scope of the analysis of impacts to regulated groundfish stocks, non-groundfish species and habitat for this action is the total range of these VECs in the Western Atlantic Ocean, as described in the Affected Environment section of the document (Section 5.1.7). However, the analyses of impacts presented in this amendment focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources occurs. For endangered and protected species, the geographic range is the total range of each species (Section 6.4).

Because the potential exists for far-reaching sociological or economic impacts on U.S. citizens who may not be directly involved in fishing for the managed resources, the overall geographic scope for human communities is defined as all U.S. human communities. Limitations on the availability of information needed to measure sociological and economic impacts at such a broad level necessitate the delineation of core boundaries for the human communities. Therefore, the geographic range for the human environment is defined as those primary and secondary ports bordering the range of the groundfish fishery (Section 6.5) from the U.S.-Canada border to, and including, North Carolina.

Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the baseline condition consists of the present condition of the VECs plus the combined effects of past, present and reasonably foreseeable future actions); PLUS (3) impacts from the Preferred Alternative and other alternatives.

A description of past, present and reasonably foreseeable future actions is presented immediately below in Table 104. 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.

A number of Impact Definitions are used for the tables in this section (Table 103).

Table 103 – Impact Definitions

	Direction		
VEC	Positive (+)	Negative (-)	Negligible/Neutral
Allocated target species, other landed species, and protected resources	Actions that increase stock/population size	Actions that decrease stock/population size	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		
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 104 - 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	Negl to L+	L-	L-	Negl	L+

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.					
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

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
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)	Likely +	Likely +	Likely +	Likely +	Likely -

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.					
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 looks to streamline the administration process whereby NOAA-sponsored, state-operated permit banks can operate in the sector allocation management program	Negl	Negl	Negl	Negl	Negl
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	-
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 +	Likely +	Likely +	ND	ND
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 -
Amendment 3 to the Spiny Dogfish FMP This amendment considers the establishment of 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+
Framework 24 to the Atlantic Sea Scallop FMP (Framework 49 to the Northeast Multispecies FMP) This framework sets specifications for scallop FY 2013 and 2014. It is also considering 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 +
FW50 to the Multispecies FMP This FW would adopt FY2013-2015 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs),	+	+	+	Negl	-

Noted: ND= Not determined

Table 105 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 105 come from fishery-related activities (e.g., federal fishery management actions – many of which are identified above in Table **104**). 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.

Table 105 - Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 48

VEC	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Regulated Groundfish Stocks	**Mixed** Combined effects of past actions have decreased effort, improved habitat protection, and implemented rebuilding plans when necessary. However, some stocks remain overfished	**Positive** Current regulations continue to manage for sustainable stocks	**Positive** Future actions are anticipated to continue rebuilding and strive to maintain sustainable stocks	**Short-term Negative** Several stocks are currently overfished, have overfishing occurring, or both **Long-Term Positive** Stocks are being managed to attain rebuilt status
Non-Groundfish Species	**Positive** Combined effects of past actions have decreased effort and improved habitat protection	**Positive** Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species	**Positive** Future actions are anticipated to continue rebuilding and target healthy stocks, thus limiting the take of discards/bycatch	**Positive** Continued management of directed stocks will also control incidental catch/bycatch
Endangered and Other Protected Species	**Positive** Combined effects of past fishery actions have reduced effort and thus interactions with protected resources	**Positive** Current regulations continue to control effort, thus reducing opportunities for interactions	**Mixed** Future regulations will likely control effort and thus protected species interactions, but as stocks improve, effort will likely increase, possibly increasing interactions	**Positive** Continued effort controls along with past regulations will likely help stabilize protected species interactions
Habitat	**Mixed** Combined effects of effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities	**Mixed** Continued fisheries management will likely control effort and thus fishery related habitat impacts but fishery and non-fishery related activities will continue to reduce habitat quality
Human Communities	**Mixed** Fishery resources have supported profitable industries and communities but increasing effort and catch limit controls have curtailed fishing opportunities	**Mixed** Fishery resources continue to support communities but increasing effort and catch limit controls combined with non-fishing impacts such as high fuel costs have had a negative economic impact	**Short-term Negative** As effort controls are maintained or strengthened, economic impacts will be negative **Long-term Positive** As stocks improve, effort will likely increase which would have a positive impact	**Short-term Negative** Lower revenues would likely continue until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies

Impact Definitions:
-Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species: positive=actions that increase stock size and negative=actions that decrease stock size
-Habitat: positive=actions that improve or reduce disturbance of habitat and negative=actions that degrade or increase disturbance of habitat
-Human Communities: positive=actions that increase revenue and well being of fishermen and/or associated businesses and negative=actions that decrease revenue and well being of fishermen and/or associated businesses

7.6.3 Baseline Conditions for Resources and Human Communities

For the purposes of a cumulative effects assessment, the baseline conditions for resources and human communities is considered the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions. The following table (Table 106) summarizes the added effects of the condition of the VECs (i.e., status/trends from Section 6.5) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 105 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 6.1and 6.5, respectively. As mentioned above, this cumulative effects baseline is then used to assess cumulative effects of the proposed management actions in Table **106**.

Table 106 - Cumulative effects assessment baseline conditions of the VECs

VEC		**Status/ Trends, Overfishing**	**Status/ Trends, Overfished**	**Combined Effects of Past, Present Reasonably Foreseeable Future Actions (**Table 105**)**	**Combined CEA Baseline Conditions**
Regulated Groundfish Stocks	GB Cod	***Yes***	***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	***Yes***	No		
	GB Yellowtail Flounder	***Yes***	***Yes***		
	SNE/MA Yellowtail Flounder	No	No		
	CC/GOM Yellowtail Flounder	***Yes***	***Yes***		
	American Plaice	No	No		
	Witch Flounder	***Yes***	***Yes***		
	GB Winter Flounder	No	No		
	GOM Winter Flounder	No	***Yes***		
	SNE/MA Winter Flounder	No	***Yes***		
	Acadian Redfish	No	No		
	White Hake	***Yes***	***Yes***		
	Pollock	No	No		
	Northern (GOM-GB) Windowpane Flounder	***Yes***	***Yes***		
	Southern (SNE-MA) Windowpane Flounder	No	No		
	Ocean Pout	No	***Yes***		
	Atlantic Halibut	No	***Yes***		
	Atlantic Wolffish	n/a	***Yes***		

Table **106 cont'd.**

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table **105 -** Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 48Table **105**)	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 but overfishing is not 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 global warming, 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.
	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 *Loligo* trawl		

Table **106 cont'd.**

VEC	**Status/Trends**	**Combined Effects of Past, Present Reasonably Foreseeable Future Actions** (Table **105**)	**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 48 Actions

The alternatives contained in Framework 48 can be divided into two broad categories, as seen in Table **106** (summary of impacts from action – for a complete discussion of impacts please see Section 7 of document). First, this action adjusts status determination criteria for some stocks within the management complex, implements formal rebuilding programs, and updates the methodology that specifies annual catch limits for several stocks. Secondly, the action adopts commercial and recreational fishing measures including measures to provide sectors access to closed areas, mortality controls, and enhance operations of the commercial fleet.

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 and 47 that used available data to translate those mortality targets into specific amounts of fish. These quantities must be defined in order to implement the ACLs and AMs called for in the amendment. The ACLs identified in FW 50 (implemented concurrently with FW48) are thus consistent with the amendment. Other elements of this process include setting the status determination criteria for GOM and GB cod, SNE/MA yellowtail flounder, and white hake; changes to scallop fishery sub-ACLs, SNE/MA windowpane flounder sub-ACLs, and GB yellowtail flounder small mesh sub-ACL

The second broad category of measures adopted by this action are measures that affect the prosecution of the commercial and recreational fishery. Modification of the AM for the recreational fishery would allow proactive measures to be implemented if necessary. The modification to the groundfish monitoring program would provide clarification of the goals and objections of the at-sea monitoring program. The CV Standard would be met for each stock at the overall stock level. Industry would not be required to fund the at-sea monitoring program in FY 2013. A lower at-sea monitor coverage rate would be applied for sector trips under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear; the coverage rate would be determined annually. The cost responsibility of at-sea monitoring for industry would be restricted to direct at-sea monitor costs; NMFS would continue to cover all other costs associated with at-sea monitoring. The dockside monitoring requirement would be eliminated. Minimum size restrictions would be modified to reduce regulatory discards, and GB yellowtail flounder discard on groundfish trips would be calculated for two different areas for better management accuracy. Sectors would be allowed to request access to certain portions of groundfish closed areas. This would provide greater access and flexibility to both target and non-target stocks. Trawl vessels transiting closed areas would not have to stow their gear in the manner as current required. Finally, a number of changes would be made to the existing AMs. The timing of the AM for stocks not allocated to sectors would be changed; if accurate data are available the AM would be implemented in the year immediately following an overage. Area-based AMs would be adopted for SNE/MA winter flounder, Atlantic halibut and Atlantic wolfish stocks that would require the use of selective trawl gear and prohibit the use of sink gillnet and longline in defined areas if the ACLs are exceeded. Possession of Atlantic halibut would be prohibited if the ACL is exceeded. In the case of SNE/MA winter flounder, there would be no restrictions on longline or gillnet gear in the applicable areas but the use of selective trawl gear would be required. The AM for SNE/MA windowpane flounder would be modified to apply to two components of the ACL, both the groundfish and the other sub-components ACLs. Common pool vessels fishing with a HA or HB permit would not be restricted if an AM is triggered for white hake, a species that is rarely caught by these vessels.

In general, the adoption of all of these measures will benefit groundfish stocks because collectively they make it more likely that mortality targets are reasonable and will not be exceeded. The measures that constitute the Proposed Action (if based on the Preferred Alternatives) are designed to achieve the rebuilding objectives for the Northeast Multispecies fishery. The most important biological impact of the proposed measures is that they would control fishing mortality on Northeast Multispecies stocks in order to prevent (or end) overfishing and rebuild overfished stocks. The adoption of additional sub-ACLs for GB yellowtail flounder and SNE/MAB windowpane flounder are the measures most likely to have positive biological impacts. These sub-ACLs, and the AMs that will be adopted as a result, will impose tighter controls on fishing mortality for these stocks. The preferred alternative changes to AMs would also contribute to achieving these objectives by providing better control of fishery catches. For example, the preferred alternative would modify recreational AMs so that measures can be changed in advance of an overage, making it less likely that an overage will occur. The measures are not likely to impact non-groundfish stocks, protected species, or habitat to any great extent when compared to the No Action alternative, since these proposed specifications differ only slightly from the No Action alternative. The measures are likely to have negligible impacts on communities. The revisions to the AMs may cause short-term economic losses if they are triggered but over the long-term the industry should benefit from keeping catches under target levels. Changes to the administration of the scallop fishery sub-ACLs, the establishment of SNE/MA windowpane flounder sub-ACLs, the revisions to the AMs would be expected to benefit the groundfish fishery in the long-term by making more likely that mortality targets will be achieved. The effects of revisions to the at sea monitoring program have the capacity to cause negative impacts to the fishery, however, some benefits would also occur, reducing negative impacts and potentially providing some long-term benefits overall. Sector exemption requests can provide benefits to the fishery, particularly if haddock catch can increase and provide additional revenue. Although the benefits and costs are highly uncertain, there is the potential for negative impacts on future productivity from fishing the closed areas.

Table 107 - 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 CRITERIA, FORMAL REBUILDING PROGRAMS, AND ANNUAL CATCH LIMITS	**REVISED STATUS DETERMINATION CRITERIA (GOM & GB COD, SNE/MA YELLOWTAIL FLOUNDER, WHITE HAKE)**	**Positive –** Revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive –** Overall revenues will increase as stocks rebuild however, revenues under the revised specs would be less than no action

	SUB-ACLS	**Positive** –. These 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	**Positive** – Overall revenues will increase as stocks rebuild however, revenues under the revised specs would be less than no action

Table 107 cont'd.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
COMMERCIAL and REC FISHERY MEASURES	**MONITORING PROGRAM**	**Neutral** -- not be expected to have any direct impacts on fishing mortality or stock size	**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 non-target species	**No impact** –measures are not expected to create additional impacts to non-target species	**Mixed** -- capacity to cause negative impacts to the fishery, however, some benefits would also occur reducing negative impacts and potentially providing some long-term benefits overall.
	COMMERCIAL MINIMUM SIZE RESTRICTIONS	**Slightly Negative --** likely be reductions in yield per recruit, MSY, and slower rebuilding progress	**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 non-target species	**No impact** –measures are not expected to create additional impacts to non-target species	**Mixed** -- unlikely that the marginal cost would outweigh the marginal revenue.
	ACCOUNTABILITY MEASURES	**Positive** – More effective accountability measures will reduce risk of exceeding mortality targets on these stocks and promote rebuilding	**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 non-target species	**No impact** –measures are not expected to create additional impacts to non-target species	**Mixed –** Overall revenues will increase as stocks rebuild, however restrictions may constrain fishing

	GB YELLOWTAIL FLOUNDER MANAGEMENT MEASURES	**Neutral --** unlikely to result in biological impacts	**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 non-target species	**No impact** –measures are not expected to create additional impacts to non-target species	**Mixed –** depending on how the discard rate is calculated.
	SECTOR MANAGEMENT PROVISIONS	**Neutral** – Some potential for negative impacts as a result of allowing access to the closed areas for some stocks – however, sectors must apply for and be granted access through sector exemptions.	**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 non-target species	**No impact** –measures are not expected to create additional impacts to non-target species	**Mixed** -- Benefits to the fishery, particularly if haddock catch can increase and provide additional revenue, however, the risk of entering the closed areas could negatively impact future productivity but the benefits and costs are highly uncertain.

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 107 provides as a summary of likely cumulative effects found in the various groups of management alternatives contained in Framework 48. The CEA baseline that, as described above in Table 106, 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.

Managed Resources

As noted in Table 106, the combined impacts of past federal fishery management actions have led to short-term impacts that result in overfishing and/or overfished status for several stocks. However, management measures, in particular modifications implemented through Amendment 16 to the FMP, are expected to yield rebuilt sustainable groundfish stocks in the future. The actions proposed by Framework 48 are expected to continue this trend. The adoption of additional sub-ACLs for GB yellowtail flounder and SNE/MAB windowpane flounder are the measures most likely to have positive biological impacts. These sub-ACLs, and the AMs that will be adopted as a result, will impose tighter controls on fishing mortality for these stocks. The changes to AMs would also contribute to achieving these objectives by providing better control of fishery catches. are expected to have positive impacts on the managed groundfish resources. These measures all increase the likelihood that mortality targets will be achieved and should continue groundfish rebuilding. The past and present impacts, combined with the Preferred Alternative and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to managed resources in the long term.

Non-Target Species

As noted in Table 106, the combined impacts of past federal fishery management actions have decreased fishing effort and improved habitat protection for non-target species. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort, and decrease bycatch and discards. The actions proposed by Framework 48 are expected to continue this trend. The modifications in effort controls in this action are not expected to impact non-target species. These changes only affect fishing in discrete geographic areas and by gear types that do not have a significant impact on non-target species. The past and present impacts, combined with the Preferred Alternative and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to non-target species.

Protected Resources

As noted in Table 106, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore reduced interactions with protected resources. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort and catch, and therefore continue to lessen interactions with protected resources. The actions proposed by Framework 48 are expected to continue this trend; however, as stocks rebuild to sustainable levels, future actions may lead to increased effort, which may increase potential interactions with protected species. The modifications in status determination criteria, and commercial fishery measures are expected to have negligible impacts, since they will not change fishing in areas or with gears that affect protected species. Overall, the combination of past, present, and future actions is expected to stabilize protected species interactions and lead to positive impacts to protected species.

Habitat, Including EFH

As noted in Table 106, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore have been positive for habitat protection. In addition, better control of non-fishing activities has also been positive for habitat protection. However, both fishing and non-fishing activities continue to decrease habitat quality. None of the fishery specifications measures are expected to substantial impacts to habitat or EFH. Generally, the modifications to commercial fishery measures are expected to have neutral or no impacts, since these actions should not greatly alter fishing practices and largely control the fishery from exceeding its ACLs. Overall, the combination of past, present, and future actions is expected to reduce fishing effort and hence reduce damage to habitat; however, it is likely that fishing and non-fishing activities will continue to degrade habitat quality.

Human Communities

As noted in Table 106, the combined impacts of past federal fishery management actions have reduced effort, and therefore have curtailed fishing opportunities. Past and current management measures, including those implemented through Amendment 16 to the FMP, will maintain effort and catch limit controls, which together with non-fishing impacts such as rising fuel costs have had significant negative short term economic impacts on human communities. The specifications for FY 2013 (FW50) are expected to have long-term positive impacts on human communities as they promote stock rebuilding, but in the short-term, impacts are likely to be negative and significant. Reductions in ACLs for GOM and GB Cod will likely cause a short term significant negative impact on human communities. Changes to the commercial and recreational fishery effort control measures are expected to have mixed, but relatively minor, impacts on communities. In the short term, this action is expected to produce slightly decreased revenue if AMs are triggered that will compound the significant economic impact on the fishing industry from past and future actions. However, this action alone is not expected to have significant socioeconomic impacts beyond what was anticipated in Amendment 16. Overall, the combination of past, present, and future actions is expected to enable a long term sustainable harvest of groundfish stocks, which should lead to a long term positive impact on fishing communities and economies.

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8.0 Applicable Law

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any Fishery Management Plan or Amendment be consistent with the ten national standards listed below.

Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
Amendment 16 to the Northeast Multispecies FMP adopted measures designed to end overfishing on the groundfish stocks that were subject to excessive fishing pressure at the time of its development. This action adjusts those measures in a way that is designed to maximize optimum yield while preventing overfishing and continuing rebuilding plans. For overfished fisheries, the Magnuson-Stevens Act defines optimum yield as the amount of fish which provides for rebuilding to a level consistent with producing the maximum sustainable yield from the fishery. The measures are designed to achieve the fishing mortality rates, and yields, necessary to rebuild the overfished stocks as well as to keep fishing mortality below overfishing levels for stocks that are not in a rebuilding program. The measures in Section 4.1.1that adopt status determination criteria and ACLs set controls on catch to ensure that the appropriate fishing mortality rates are implemented. Changes to commercial and recreational fishery measures in Section 4.2 implement and adjust programs to achieve the desired mortality levels.

Conservation and management measures shall be based on the best scientific information available.
The Preferred Alternatives are based on the most recent estimates of stock status available for each of twenty stocks included in the management unit. These estimates are mostly in the form of information provided by the Northeast Fisheries Science Center in the NE Groundfish 2012 Updates Integrated Peer Review Meeting, subsequent benchmark assessments (SARC 53 for SNE/MA yellowtail flounder and SARC 55 for GOM cod and GB cod) and the most recent TRAC proceedings (2012). For all stocks under the 2012 Updates, stock size and fishing mortality in calendar year 2010 was estimated based on catch, trawl survey, observer, and other data through 2010. Management targets for this action are also based on the results of the Updates to the GARM III and benchmarch assessments, which contain a comprehensive review of fishing mortality thresholds and biomass targets for the groundfish complex. Additionally, the proposed mortality limits were determined based on the scientific advice of the SSC, which recommends ABCs to the Council.

With respect to bycatch information, the action uses bycatch information from the most recent assessments. Bycatch data from observer reports, vessel logbooks, or other sources must be rigorously reviewed before conclusions can be drawn on the extent and amount of bycatch. While additional observer data has been collected since the most recent assessments were completed, it has not been analyzed or reviewed through the stock assessment process and thus cannot be used.

The economic analyses in this document are based primarily on landings, revenue, and effort information collected through the NMFS data collection systems used for this fishery.

To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The Preferred Alternatives manage each individual groundfish stock as a unit throughout its range. Management measures specifically designed for one stock 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. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. Even if the measures are designed to treat all permit holders the same, the fact that fish stocks are not distributed evenly, and that individual vessels may target specific stocks, means that distributive impacts cannot be avoided.

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

The Preferred Alternatives are not expected to significantly reduce the efficiency of fishing vessels. These measures are considered practicable since they allow rebuilding of depleted groundfish stocks and have considered efficiency to the greatest extent possible. Some of the Preferred Alternatives in fact increase efficiency, including the establishment of allocating groundfish to the scallop fishery access areas and revising of discard strata for GB yellowtail flounder. 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. Other proposed measures specifically aim to reduce costs such as removing dockside monitoring requirements, limiting industry responsibility for at-sea monitoring and deferring industry responsibility until after FY 2013. These measures accomplish other goals, however, by allowing groundfish stocks to rebuild. The measures do not duplicate other regulatory efforts. Other measures, including allowing sector exemption requests to closed areas allow vessels more flexibility and can minimize costs. Management of multispecies stocks in federal waters is not subject to coordinated regulation by any other management body. Absent Council action, a coordinated rebuilding effort to restore the health of the overfished stocks would not occur.

The Council considered the costs and benefits of a range of alternatives to achieve the goals and objectives of this FMP. It considered the costs to the industry of taking no action relative to adopting the measures herein. The expected benefits are greater in the long-term if stocks are rebuilt, though it is clear there are substantial short-term declines in revenue and possible increases in costs that can be expected.

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

Consistent with the requirements of the Magnuson-Stevens Act to prevent overfishing and rebuild overfished stocks, the Preferred Alternatives may restrict fishing activity through the implementation of low ACLs on certain stocks in order to achieve rebuilding targets. Analyses of the impacts of these measures show that landings and revenues are likely to decline for many participants in upcoming years due to the rebuilding programs in place for many stocks. In the short term, these declines will probably have negative impacts on fishing communities throughout the region, but particularly on those ports that rely heavily on groundfish. These declines are unavoidable given the M-S Act requirements to rebuild overfished stocks. The need to control fishing mortality means that catches cannot be as high as would likely occur with less stringent management measures.

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

Many measures adopted in Amendment 16 were designed to limit the discards of both groundfish and some other species, including the sector management program, and this action is expected to continue those benefits with no substantial changes.

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

Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, the removal of trawl gear stowage requirement in particular, are the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

8.1.2 Other M-SFCMA requirements

Section 303 (a) of FCMA contains 14 required provisions for FMPs. These are discussed below. It should be emphasized that the requirement is imposed on the FMP. In some cases noted below, the M-S Act requirements are met by information in the Northeast Multispecies FMP, as amended. Any fishery management plan that is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

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 action provides a summary of that information and additional relevant information about the fishery in Section 6.5.

assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

The present biological status of the fishery is described in Section 6.2. Likely future conditions of the resource are described 7.6.5. Impacts resulting from other measures in the management plan other than the specifications included here can be found in Amendment 16. The maximum sustainable yield for each stock in the fishery is defined in Amendment 16 and optimum yield for the fishery is defined in Amendment 9.

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 and 47. 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 7.2.3.

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.

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;

The Standardized Bycatch Reporting Methodology omnibus amendment 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 methodology no longer applies to this framework. The revision of minimum fish sizes are expected to reduce regulatory discards.

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 the commercial sector is updated and summarized in this document (Section 6.5).

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 adopts Status Determination Criteria for some stocks.

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.

This action does not specify ACLs for groundfish stocks and does not meet this requirement.

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.

8.1.3.1 Description of Action

Framework 48 adopts modifications to the management program. The Preferred Alternatives include:

- Revised status determination criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and white hake
- Sub-ACL changes including setting a windowpane flounder sub-ACLs for the scallop fishery and other sub-components, changes to the method used to determine the scallop fishery yellowtail flounder sub-ACL, setting a yellowtail flounder sub-ACL for small mesh fisheries
- Changes to AMs including revisions to recreational fishery AMs, changes to the timing of AMs for stocks not allocated to sectors, changes to the AMs for halibut, wolffish, and SNE/MA windowpane, and revised HA and HB permit AMs
- Monitoring changes including specifying groundfish monitoring goals and objectives, setting ASM coverage levels, modifying at-sea monitoring cost responsibility, and elimination of the dockside monitoring requirement
- Changes to minimum fish size limits
- Changes to small mesh fishery gear requirements to minimize flounder catches
- Revisions to the discard strata for GB yellowtail flounder
- Removal of trawl gear stowage requirements in closed areas
- Allowing sectors to request exemptions to the year-round mortality closures

Location of proposed action and overlap with designated EFH

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. This range of activity encompasses designated EFH for numerous species managed by both the New England and Mid-Atlantic Fishery Management Councils, as described in the Affected Environment section of this document. 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.

8.1.3.2 Potential Adverse Effects of the Action on EFH

Potential anticipated changes in adverse effects of the groundfish fishery on EFH as a result of the proposed action are summarized below. Measures are grouped according to those expected to have negative impacts, neutral impacts, positive impacts, and uncertain impacts. Those measures that could potentially result in adverse effects are discussed further below the table. Measures associated with neutral, positive, or uncertain changes in adverse effects are not discussed further here. See the EFH impacts section of this document for additional information.

Table 108 – Summary of possible adverse effects to EFH associated with the Preferred Alternatives.

	Proposed Measure
Possible negative impacts	Revise discard strata for GB yellowtail flounder
	Allow sectors to request exemptions for groundfish mortality closures
	Reduce commercial fishery minimum size restrictions
Neutral impacts	Revise recreational AMs
	Revise monitoring program
	Revise commercial fishery accountability measures
	Eliminate trawl gear stowage requirements in closed areas
Possible positive impacts	Revise status determination criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, white hake
	Set SNE/MA windowpane flounder sub-ACLs
	Change small mesh fishery gear requirements
Uncertain impacts	Scallop fishery sub-ACL for yellowtail flounder
	Small mesh fisheries sub-ACL for yellowtail flounder

Revising the discard strata for GB yellowtail flounder could have possible negative impacts as compared to no action. If this measure allows more effort in area 522 and elsewhere on other stocks such as haddock, this could increase fishing activity and thereby EFH impacts. However, this revision would also be expected to increase groundfish catches. Overall, the influence of this measure on adverse effects in the fishery is probably relatively minor, and should be considered in the context of potential increases in groundfish yield.

Reducing commercial fishery minimum size restrictions could have positive impacts as compared to no action over the short term; but may have negative impacts over the long term. Assuming that catch can be converted to landings, in the short term this measure could potentially reduce fishing time, area swept, and EFH impacts as compared to current size limits. However, if there are negative biological consequences and stock sizes and catch rates are reduced, impacts may increase over the long term as a result of reduced catch rates. Overall, the influence of this measure on adverse effects in the fishery is difficult to assess but probably relatively minor. If these changes lead to biological changes to groundfish stocks, these will be accounted for when future ACLs are determined.

Allowing sectors to request exemptions from groundfish mortality closures could have positive or negative impacts as compared to no action. In a broad context, fishing in the exemption areas could reduce fishing pressure in other areas where catch rates of certain species are lower. Because overall catches are limited by ACLs, more efficient fishing is expected to have benefits for seabed habitats. Specifically, fishing in areas with relatively high catch rates could reduce area swept and seabed contact per amount of catch and thereby reduce adverse effects. However, despite possible overall benefits, there may be localized negative impacts of allowing fishing in areas that have been closed to groundfish gears, specifically otter trawls, for many years. However, it is important to note that current or proposed habitat management areas are not included in the exemption program. Thus, even though the closure of groundfish mortality areas to certain types of fishing has been credited with adverse effects reduction in the past, the most vulnerable habitat areas will not be potentially subject to fishing as a result of this action. That being said, the exemption areas are likely not uniformly vulnerable to fishing, and locations of specific concern have been highlighted in the impacts section of this document. In addition, this action merely allows sector vessels to request such exemptions, and does not actually grant fishing privileges within current mortality closures.

8.1.3.3 Proposed Measures to Avoid, Minimize, or Mitigate Adverse Impacts of this Action

The overall habitat impacts of all the measures combined in this action are expected to have neutral effects on EFH. Relative to either the baseline habitat protections established under Amendment 13 to the Northeast Multispecies FMP or as compared to the No Action alternative, the impacts are likely negligible, or perhaps even positive as overall fishing effort in the groundfish fishery has declined over time. Therefore, despite potential negative impacts associated with some of the alternatives, measures to further mitigate or minimize adverse effects on EFH are not necessary.

8.1.3.4 Conclusions

The Cumulative Effects Analysis demonstrates that the overall habitat impacts of all the measures combined in this action have marginally positive impacts on habitat relative to the No Action alternative. The action proposed under this amendment will, therefore, not have any adverse effect on EFH of federally managed species. Because there are no additional adverse impacts associated with this action, no EFH consultation is required.

8.2 National Environmental Policy Act (NEPA)

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the M-S Act and NEPA. The Council on Environmental Quality (CEQ) has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), as has NOAA in its agency policy and procedures for NEPA in NAO 216-6 §5.04b.1. All of those requirements are addressed in this document, as referenced below.

8.2.1 Environmental Assessment

The required elements of an Environmental Assessment (EA) are specified in 40 CFR 1508.9(b) and NAO 216-6 §5.04b.1. They are included in this document as follows:

- The need for this action is described in Section 3.2;
- The alternatives that were considered are described in Section 4.0;
- The environmental impacts of alternatives are described in Section 7.0;
- The agencies and persons consulted on this action are listed in Section 8.2.4.

While not required for the preparation of an EA, this document includes the following additional sections that are based on requirements for an Environmental Impact Statement (EIS).

- An Executive Summary can be found in Section 1.0.
- A table of contents can be found in Section 2.0.
- Background and purpose are described in Section 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 10.0.

8.2.2 Finding of No Significant Impact (FONSI)

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

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

<u>Response:</u> The Preferred Alternatives cannot reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action. All of the Preferred Alternatives are designed to achieve the objectives of the M-S Act and to comply with the requirements of that statute. With respect to biological objectives, the Preferred Alternatives are designed to assist in controlling fishing mortality so that overfishing is ended and stocks rebuild. For this reason they cannot be reasonably expected to jeopardize the sustainability of any target species.

(2) *Can the Preferred Alternatives reasonably be expected to jeopardize the sustainability of any non-target species?*

<u>Response:</u> For fishery resources that are caught incidental to groundfish fishing activity, there is no indication in the analyses that the alternatives will threaten sustainability. The Preferred Alternatives will result in relatively small changes in groundfish fishing effort and since the fishery does not currently jeopardize non-target species it is not likely that these alternatives will change that status. One Preferred Alternative may result in fishing activity in parts of currently closed areas, but the analyses do not suggest that this limited access will jeopardize the sustainability of any non-target species.

(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. One alternative, if implemented, would allow increased access by some fishing vessels to parts of year-round closed areas. This access will not be allowed in those areas that have been identified for minimizing, to the extent practicable, the adverse effects of fishing activity on EFH.

(4) *Can the Preferred Alternatives be reasonably expected to have a substantial adverse impact on public health or safety?*

Response: Nothing in the Proposed Action can be reasonably expected to have a substantial adverse impact on public health or safety. Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near term future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

(5) *Can the Preferred Alternatives reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response: The Preferred Alternatives cannot be reasonably expected to adversely affect endangered or threatened species. As discussed in Section 7.3, these species are expected to have very minimal impacts from the measures that are proposed.

(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 continued use of ACLs that were adopted in Amendment 16 and subsequent actions 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, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH. It is therefore reasonable to expect that there will not be substantial impact on biodiversity or ecosystem function.

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

Response: The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternatives. The Preferred Alternatives are designed to implement changes to the Northeast Multispecies management program that will help achieve the plan's objectives. Many of the Preferred alternatives would improve monitoring of catches and adherence to catch limits or facilitate achieving OY. These measures will promote groundfish rebuilding programs that were implemented as a result of Amendments 13 and 16 to the Northeast Multispecies FMP. As described in Section 7.1, the action is expected to continue the rebuilding trajectories for most stocks that have been adopted. The action cannot be reasonably expected to have a substantial impact on habitat or protected species (see Sections 7.2and 7.3), as the impacts are expected to fall within the range of those resulting from Amendment 16. The action's potential economic and social impacts are also addressed in the environmental assessment (see Sections 7.4 and 7.5, respectively) and more specifically in the Executive Order 12866 review (Section 8.11.1) and the Initial Regulatory Impact Review (Section 8.11).

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

Response: The effects of the Preferred Alternatives on the quality of human environment are not expected to be highly controversial in the context of NEPA. The need to rebuild groundfish stocks is well-documented and a long series of management actions have been taken to improve the status of those stocks. While there has been some debate over how quickly to rebuild those stocks and the desired biomass for each stock, legal requirements established by the M-S Act render these discussions moot. Alternatives in this document that modify the ACL system, improve monitoring programs, and change AMs are expected to improve the ability to achieve mortality targets. At the same time, however, the M-S Act requires that measures also address the needs of fishing communities and fishermen so that society reaps benefits from fishery resources. Many of the alternatives are designed to address this requirement, such as by reducing minimum sizes in order to reduce regulatory discards, and by providing vessels that participate in groundfish fishing sectors the possibility of limited access to year-round groundfish closed areas.

This last measure (i.e. modifying sector exemption provisions so that sectors can request access to parts of year-round groundfish closed areas) is one that has been opposed by some members of the public, but is supported by others. There has been some dispute about whether this access should be allowed before a more holistic examination of area management issues that is ongoing as part of the Omnibus Habitat Amendment is completed. This action is narrow in scope, however, and does not propose to modify the existing habitat closure areas. Much of the area that will be eligible for sector vessel access is already fished by either commercial groundfish fishing vessels as part of Special Access Programs, scallop fishing vessels as part of the scallop fishery management program, recreational fishing vessels, and other fishing vessels. The issues raised in opposition to this measure have been examined. Therefore, the opposition is not believed to be highly controversial as defined by NEPA.

(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 significant 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 and initiated stock rebuilding. The administrative measures are relatively minor modifications. 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.

(11) *Is the Preferred Alternative related to other actions with individually insignificant, but cumulatively significant impacts?*

Response: The Proposed Action is not related to other actions with individually insignificant but cumulatively significant impacts. Recent management actions in this fishery include FW 42, FW 43, Amendment 16, FW 44, FW 45, FW 46, and FW 47. FW 42 developed specific measures implementing programs adopted by Amendment 13; each was determined to be insignificant. FW 43 adopted limits on groundfish bycatch by mid-water trawl herring vessels and was not determined to have a significant effect on either the groundfish or herring fisheries. Amendment 16 had significant impacts and thus required the preparation of an EIS, while Frameworks 44 and 46 set specifications as required under Amendment 16 and made relatively minor adjustments to the sector administration program. Framework 46 modified the amount of haddock that may be caught by the midwater herring fishery. Some of the measures that may be adopted by this action will affect scallop fishing activity and were take into account during the development of Scallop Framework Adjustment 24, which is in review, but that action is not expected to have cumulatively significant impacts. Therefore, the Preferred Alternatives, when assessed in conjunction with the actions noted above, would not have significant impacts on the natural or physical environment.

(12) *Are the Preferred Alternatives likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources?*

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 several wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternatives would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near wrecks to avoid tangling gear. Therefore, this action would not result in any adverse effects to wrecks.

(13) *Can the Preferred Alternatives reasonably be expected to result in the introduction or spread of a non-indigenous species?*

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. 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. In particular, the measure that allows groundfish fishing sectors to request access to parts of groundfish closed areas is not expected to establish a precedent for access to any other areas that may be adopted in the future.

(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 48 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 47 will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the Proposed Action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not required.

__________________________________ ________________________

Northeast Regional Administrator, NOAA Date

8.2.3 List of Preparers; Point of Contact

Questions concerning this document may be addressed to:

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8.2.4 Agencies Consulted

The following agencies were consulted in the preparation of this document:

Mid-Atlantic Fishery Management Council
New England Fishery Management Council, which includes representatives from the following additional organizations:
- Connecticut Department of Environmental Protection
- Rhode Island Department of Environmental Management
- Massachusetts Division of Marine Fisheries
- New Hampshire Fish and Game
- Maine Department of Marine Resources

National Marine Fisheries Service, NOAA, Department of Commerce
United States Coast Guard, Department of Homeland Security

8.2.5 Opportunity for Public Comment

The Preferred Alternatives were developed during the period January 2012 through January 2013 and was discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Date	Meeting Type	Location
2012		
6/19-21/2012	Council Meeting	Holiday Inn by Bay, Portland, ME
8/2/12	Oversight Committee	Sheraton Harborside, Portsmouth, NH
9/11/12	GF PDT	MA DMF, New Bedford, MA
10/1/12	GF PDT Conference Call	
10/11/12	Oversight Committee	Ashworth By the Sea, Hampton, NH
10/2/12	GF PDT	Holiday Inn, Mansfield, MA
10/3/12	Recreational Advisory Panel	Holiday Inn, Peabody, MA
10/4/12	Groundfish Advisory Panel	Holiday Inn, Peabody, MA
10/24/12		
11/5/12	Groundfish OS Mtg	Holiday Inn By the Bay, Portland, ME
11/13-11/15/12	Council Meeting	Newport Marriott, Newport, RI
11/28/12	Groundfish PDT Conference Call	
12/19/2011	Groundfish OS Meeting	Wakefield, MA
12/12/2012	Council Meeting	Wakefield, MA

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. 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 alter or modify any 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 47.

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 6.4 of this document.

8.5 Coastal Zone Management Act

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to Section 930.36(c) of the regulations implementing the Coastal Zone Management Act, NMFS made a general consistency determination that the Northeast Multispecies Fishery Management Plan (FMP), including Amendment 16, and Framework Adjustment 47, is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. This general consistency determination applies to the current NE Multispecies Fishery Management Plan (FMP), and all subsequent routine federal actions carried out in accordance with the FMP such as Framework Adjustments and specifications. A general consistency determination is warranted because Framework Adjustments to the FMP are repeated activities that adjust the use of management tools previously implemented in the FMP. A general consistency determination avoids the necessity of issuing separate consistency determinations for each incremental action. This determination was submitted to the above states on October 21, 2009. To date, the states of North Carolina, Rhode Island, Virginia, Connecticut, New Hampshire, and

Pennsylvania have concurred with the General Consistency Determination. Consistency was inferred for those states that did not respond.

8.6 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedure Act, and these requirements will continue to be followed when the proposed regulation is published. Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by federal agencies. The purpose of these requirements is to ensure public access to the federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

8.7 Data Quality Act

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

8.7.1 Utility of Information Product

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

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

This document is available in several formats, including printed publication, CD-ROM, and online through the Council's web page in PDF format. The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

8.7.2 Integrity of Information Product

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

8.7.3 Objectivity of Information Product

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

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. These update assessments were reviewed by the SAW 54 (NEFSC 2012), the NE Groundfish 2012 Updates Integrated Peer Review Meeting (NEFSC 2012), and SAW 55 (NEFSC 2013) which all included participation by independent stock assessment scientists. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries Service observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Groundfish Plan Development Team/Monitoring Committee.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the Preferred Alternatives were conducted using information from the most recent complete calendar years, through 2011, and in some cases includes information that was collected during the first eight months of calendar year 2012. Complete data were not available for calendar year 2012. The data used in the analyses provide the best available information on the number of harvesters in the fishery, the catch (including landings and discards) by those harvesters, the sales and revenue of those landings to dealers, the type of permits held by vessels, the number of DAS used by those vessels, the catch of recreational fishermen and the location of those catches, and the catches and revenues from various special management programs. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the groundfish fishery.

The policy choices are clearly articulated, in Section 4.0 of this document, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in Section 7.0 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

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

8.8 Executive Order 13132 (Federalism)

This E.O. established nine fundamental federalism principles for federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed in FW 48. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council). No comments were received from any state officials relative to any federalism implications that may be associated with this action.

8.9 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. As of the date of submission of this FMP, the list of MPA sites has not been developed by the departments. No further guidance related to this Executive Order is available at this time.

8.10 Paperwork Reduction Act

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

FW 48 does not modify existing collection of information requirements implemented by previous amendments to the FMP that are subject to the PRA, including:

- Reporting requirements for SAPs and the Category B (regular) DAS Program
- Mandatory use of a Vessel Monitoring System (VMS) by all vessels using a groundfish DAS
- Changes to possession limits, which will change the requirements to notify NMFS of plans to fish in certain areas
- Provisions to allow vessel operators to notify NMFS of plans to fish both inside and outside the Eastern U.S./CA area on the same fishing trip

8.11 Regulatory Impact Review

8.11.1 Executive Order 12866

The purpose of E.O 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 8.11 of this document represents the RIR, which includes an assessment of the costs and benefits of the Proposed Action in accordance with the guidelines established by E.O. 12866. The analysis included in the RIR shows that this action is not a "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may:

- Have an annual effect on the economy of $100 million or more, or adversely affect, in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

A more detailed discussion of economic impact is provided in Section 7.4. The discussion to follow provides a summary of those findings.

8.11.1.1 Objectives

The goals and objectives of Framework Adjustment 48 are the same as 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 Untied 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 transboundary 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 6.5.1 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 proposed alternative of FW48 as mandated by EO 12866. The focus will be on the expected changes 1) in net benefits and costs to stakeholders of the New England Groundfish Fishery, 2) changes to the distribution of benefits and costs within the industry, 3) changes in income and employment, 4) cumulative impacts of the regulation, and 5) changes in other social concerns. Much of this information is captured already in the detailed economic impacts and social impacts analyses of Sections 7.4 and 7.5 of this document. This RIR will summarize and highlight the major findings of the economic impacts analysis provided in section 7.4 of this document, as mandated by EO 12866. For social impacts of each alternative, see Section 7.5.

When assessing net benefits and costs of the regulations, it is important to note that the analysis will focus on producer surplus only, namely the impacted fishing businesses. Consumer surplus is not expected to be affected by any of the regulatory changes proposed in FW48, given the large supply of domestic and foreign seafood imports. It is also important to note that much of the analysis included in the RIR is qualitative given the nature of the proposed regulation, available data, and uncertainty of outcomes.

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

8.11.1.4.1.1 Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake

A detailed description of this alternative can be found in Section 4.1.1 of this document.

8.11.1.4.1.1.1 Option 1: No Action

Under this option, status determination criteria set forth set forth in Amendment 16 for GOM cod, GB cod, SNE/MA yellowtail flounder, and white hake will persist. This is not expected to have any immediate economic impacts since it does not alter the current methodology used for setting the allowable biological catch (ABC) for each species. In the long term it is possible that using outdated determination criteria will result in overfishing, leading to lower future revenues and potentially higher searching costs on fishing trips. See Section 7.4.2.1.1 of this document for more information.

8.11.1.4.1.1.2 Option 2: Revised Status Determination Criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and White Hake (Preferred Alternative)

Modifications to the status determination criteria for GOM cod, GB cod, SNE/MA yellowtail flounder, and white hake will influence how ABCs and in turn ACLs for each species are set. The proposed determination criteria are expected to result in lower ABCs and ACLs in the short term, negatively impacting fishing revenues. Given the current information and management uncertainty it is not possible to directly quantify the severity of such impacts at this time. In the long run, the new ABCs are expected to result in increased biomass and future landings. See Section 7.4.2.1.2 for more information.

8.11.1.4.1.2 SNE/MA Windowpane Flounder Sub-ACLs

A detailed description of this alternative can be found in Section 4.1.2 of this document.

8.11.1.4.1.2.1 Option 1: No Action

No economic impact is expected since this option will maintain the status quo.

8.11.1.4.1.2.2 Option 2: Scallop Fishery SNE/MA Windowpane Flounder Sub-ACL (*Preferred Alternative*)

The adoption of a SNE/MA windowpane flounder sub-ACL for the scallop fishery is expected to have a positive impact on the multispecies fishery by reducing the costs of overages triggered by the scallop fishery. By lowering the uncertainty of overages to the groundfish sub-ACL it also allows for better business planning and thus reduced operating costs in the multispecies fishery.

The economic impacts to the scallop fishery will depend on the overall allocation that they receive and the details of the yet to be defined AMs that will become part of future scallop FMPs. If the sub-ACL of SNE/MA windowpane flounder assigned to the scallop fishery is set below historical catch levels, this would result in a reduction in revenues. Also, if new AMs are triggered and shift effort to months or areas with lower scallop abundance, operating costs would likely increase.

In the long-term, it is expected this alternative will help to minimize overfishing creating higher future landings and increased catchability across the board. It is likely that this alternative will also incentivize the scallop fishery to use selective technologies and avoidance strategies of SNE/MA windowpane flounder. Since the sub-ACLs are not currently known and since the accountability measures for the scallop fishery are not yet defined, it is not possible at this time to quantify these impacts. See section 7.4.2.2.2 for more details.

8.11.1.4.1.2.3 Option 3: Other Sub-Components Sub-ACL (Preferred Alternative)

The adoption of a SNE/MA windowpane flounder sub-ACL for the other sub-components is expected to have a positive impact on the multispecies fishery by reducing the costs of overages triggered by the other sub-components fisheries. By lowering the uncertainty of overages to the groundfish sub-ACL it also allows for better business planning and thus reduced operating costs.

This option would treat the portion of the groundfish sub-ACL allocated to other sub-components as its own sub-ACL allowing for the adoption of AMs for other sub-components. This will shift accountability onto the other sub-components fisheries and could increase operating costs or reduced revenues in the event of overages. Since the sub-ACLs are not currently known and since the accountability measures for the other sub-components fisheries are not yet defined, it is not possible at this time to quantify these impacts.

Through the prevention of overfishing, this option has the potential to increase future yields and catch rates of SNE/MA windowpane flounder. For more information see section 7.4.2.2.3.

8.11.1.4.1.3 Scallop Fishery Sub-ACL for Georges Bank Yellowtail Flounder

A detailed description of this alternative can be found in Section 4.1.3 of this document.

8.11.1.4.1.3.1 Option 1: No Action

Option 1 will not change the way the scallop fishery sub-ACL for GB yellowtail flounder is determined. Since this option maintains the status quo it does not have any new economic impact. There is an existing cost to both the multispecies and scallop fisheries resulting from the uncertainty associated with setting the scallop sub-ACL from year to year. See section 7.4.2.3.1 for a detailed analysis of the potential economic impacts to the scallop fishery resulting from AMs under different overage scenarios. In the worst-case scenario, if an overage is greater than 56%, there will be no access to CAII and revenues would decline by $16.2 million and total economic benefits would decrease by $16.9 million in FY 2014 (Table 86and Table 87).

8.11.1.4.1.3.2 Option 2: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Based on Estimated Catch

Under this option the scallop fishery sub-ABC for GB yellowtail flounder will be set at 90% of their expected catch and the corresponding sub-ACL will be adjusted to account for uncertainty. A detailed economic analysis of this option is provided in Section 7.4.2.3.2. In summary, this option could lead to a disproportionate allocation of quota between the multispecies and scallop fisheries since it is based on a fixed percentage and does not depend on the overall GB yellowtail flounder ABC.

From the multispecies fishery perspective, this option increases the risk that they will trigger AMs due to an insufficient allocation of GB yellowtail founder. This uncertainty and increased risk will likely increase operating costs in the multispecies fishery. From the scallop perspective, this option reduces the uncertainty as to how their sub-ACL will be set and guarantees that they will receive an allocation of 90 percent of their expected catch regardless of ABC. This would allow for better business planning than under the no action alternative. Since the allocation will be set at 90 percent versus 100 percent of expected catch and since expected catch has uncertainty built around it, there is still the potential for costly overages to the scallop fishery, though the likelihood of such overages will likely be decreased. As with Option 1, in the worst-case scenario, if this option is adopted and leads to a sub-ACL overage of 56% or more, CAII will be closed and revenues are estimated to decline by $16.2 million and total economic benefits would decrease by $16.9 million in FY 2014.

8.11.1.4.1.3.3 Option 3: Scallop Fishery Sub-ACL for GB Yellowtail Flounder Specified Based on Catch History (Preferred Alternative)

Option 3, unlike Option 1 and Option 2, uses a fixed percentage of the US GB yellowtail flounder ABC to set the sub-ABCs for the multispecies and scallop fisheries. This means that changes in overall ABC for GB yellowtail flounder will be proportionally distributed. This alternative will remove the uncertainty around how sub-ACLs are assigned across the multispecies and scallop fisheries allowing for better business planning. This option could also reduce management costs slightly by minimizing labor hours spent setting the sub-ABCs each year. There is a higher risk of efficiency loss from underutilization associated with this option versus Option 1 and Option 2, since the sub-ACLs will not incorporate the latest stock and catch information each year and because quota is non-transferable between the fisheries. This would represent an economic loss to the nation through failure to achieve optimal yield.

Under this option, the scallop fishery is expected to have a reduced likelihood of an overage that triggers the AM in FY 2013, based on an initial allocation of 40 percent of the US ABC. However, in subsequent fishing years, the scallop fishery sub-ABC will be based on a fixed percentage of 16% of the US ABC. This allocation is expected to cover only a small percentage (approx. 23%) of the medium estimate for catch of yellowtail flounder by the scallop fishery in FY 2014. This will likely lead to overages that trigger the closure of CAII in FY 2015 (or FY 2016 depending on when reliable catch data becomes available). There is insufficient information to predict the expected change in scallop revenues in FY 2015 and beyond at this time. Depending on the recovery path of the GB yellowtail flounder stock, the fixed allocation percentages stipulated under this option may become less restrictive to the scallop fishery going forward. It is important to note that under all three options, the impacts of overages will be the same, but it is the likelihood of overages occurring that differs between the options. For a more in-depth analysis, see Section 7.4.2.3.3.

8.11.1.4.1.4 Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder

A detailed description of this alternative can be found in Section 4.1.4 of this document.

8.11.1.4.1.4.1 Option 1: No Action

If Option 1 is selected, there will be no new GB yellowtail flounder sub-ACL for small-mesh fisheries. Small-mesh fisheries will continue to operate under the umbrella of other sub-components to the multispecies fishery. Since this option maintains the status quo it does not have any new economic impact.

8.11.1.4.1.4.2 Option 2: Small-Mesh Fisheries Sub-ACL for GB Yellowtail Flounder (Preferred Alternative)

Option 2 will assign a fixed percentage of the US GB yellowtail flounder ABC to small-mesh fisheries based on their catch history. As discussed in Section 7.4.2.4.2, this option is expected to have a positive economic impact on the multispecies fishery through reduced risk of overages from the other sub-components fishery and the associated multispecies AM. As for the small-mesh fisheries, it will reduce allocation uncertainty allowing for better decision making, but will also increase accountability in the event of overages. In the long-run, it is expected that this option will help prevent overfishing which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land GB yellowtail flounder.

Given the uncertainty of overages, future stock conditions, and allocation levels, it is not possible to quantify these impacts.

8.11.1.4.2 Commercial and Recreational Fishery Measures

8.11.1.4.2.1 Management Measures for the Recreational Fishery

This section considers changing recreational fishery management measures as necessary to control catches of GOM cod and GOM haddock. A detailed description of this alternative can be found in Section 4.2.1 of this document.

8.11.1.4.2.1.1 Option 1: No Action

Under Option 1, there will be no changes made to the recreational fishery AMs. As discussed in Section 7.4.3.1.1 the use of a three-year average for assessing whether or not catch has exceeded the recreational ACL is scheduled to begin in FY 2013. This type of reactive accountability measure could potentially lead to overfishing, resulting in negative impacts to the stocks and future landings for both recreational and commercial fishermen. It could also, result in under-fishing which represents an economic loss to society through failure to achieve optimum yield.

8.11.1.4.2.1.2 Option 2: Revised Accountability Measure for the Recreational Fishery (Preferred Alternative)

As discussed in Section 7.4.3.1.2, this option would allow recreational measures to go into effect in anticipation of expected catch levels in order to both achieve OY and prevent overfishing. Management measures will be implemented at the start of the following fishing year in which an overage or underage is expected. The expected economic benefits are increased revenues through optimal yield and higher future landings and stock sustainability through prevention of overfishing. Recreational businesses that rely on the managed stocks may experience increased operating costs due to the increased volatility in fishery measures from year to year. In addition, it is expected that management costs will increase since regulation will become more interactive, requiring more data gathering and analysis, as well as Council input.

8.11.1.4.2.2 Groundfish Monitoring Program Revisions

8.11.1.4.2.2.1 A detailed description of this alternative can be found in Section 4.2.2 of this document.

8.11.1.4.2.2.2 Option 1: No Action

This option would push the cost burden of both at-sea monitoring and dockside monitoring completely onto sector vessels in FY 2013 and subsequent years. Sector vessels account for more than 98% of the commercial groundfish fishery. See Section 7.4.3.2.1of this document for retrospective estimates of the impact, had this occurred in FY 2011. Given current information it is not possible to quantify the impact of this regulation going forward; however sector operating costs will rise for sure. Based on the FY 2011 counterfactual evidence, it seems likely that vessels less than 50 feet in length will be the most impacted in terms of net revenues. Depending on coverage rates, labor costs, and catch rates in FY 2013 and on, some vessels may no longer be able to fish at a profit and will be forced to lease their quota or exit the industry. Since small vessels have less scalability, it will be more difficult for them to offset the costs of monitoring through increased trip landings. Industry consolidation could have other negative downstream impacts such as reduction in crew income and earnings.

8.11.1.4.2.2.3 Option 2: Monitoring Program Goals and Objectives (Preferred Alternative)

Option 2 is an administrative measure that will expand upon the goals and objectives of monitoring programs laid out in Amendment 16. See Section 7.4.3.2.2 for more information.

8.11.1.4.2.2.4 Option 3: ASM Coverage Levels

There are three sub-options, A, B, and C, under Option 3. The economic impacts of these are discussed in Section 7.4.3.2.3 and summarized below.

Option A1 requires ASM coverage equal to the coefficient of variation (CV) in the Standardized Bycatch Reporting Methodology at the stock level (the existing coverage rate). Option A2 requires coverage equal to the CV at the stock and sector levels. Option A2 has the potential to raise operating costs to the industry in the short-term negatively impacting net revenues and profitability. There is the potential that increased operating costs could drive vessels with small profit margins out of the industry. In the long-term, Option A2 has the potential to increase landings through more accurate discard rates, which allows less quota to be expended on sector trips and prevents overfishing from occurring.

Under Option B, the groundfish industry would be exempt from ASM costs in FY 2013, however the law would then default back to that under Option 1 in subsequent years. This delay in cost responsibility would provide short-term relief to sector vessels by not raising their operating costs for another year. It would however also increase government spending on monitoring in FY 2013. In the long-term, the impacts would be the same as listed under Option 1.

Option C1 would reduce ASM coverage rates for sector trips under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear. Option C2 would remove all ASM coverage from such trips. Reducing coverage rates or removing them would have a positive economic impact in terms of operating costs for vessels making these trips and would allow for redistribution of ASM funds to trips with higher groundfish landings. There is a risk with Option C1 or to a greater extent with Option C2 that as coverage rates decline, so does the accuracy of discard estimates. This could lead to lower quota efficiency or overfishing, however given the small amounts of groundfish typically landed on these trips, it is likely that the benefits of redistributing ASM funds to other trips will outweigh the costs.

8.11.1.4.2.2.5 Option 4: Industry At - Sea Monitoring Cost Responsibility (Preferred Alternative)

This option would ensure that the industry is only responsible for covering the at-sea portion of ASM costs and the government would pay for all overhead associated with the program. This would represent a small positive economic impact to sector vessels by reducing their operating costs slightly as compared to Option 1. As discussed in Section 7.4.3.2.4, the at-sea portion of ASM per day costs account for 75 percent of the total cost. Under this option government expenditures for the ASM program would increase over Option 1 by the cost of the ASM overhead.

8.11.1.4.2.2.6 Dockside Monitoring Requirements

Under sub-option 1 of DSM, the industry will be responsible for funding the DSM program fully starting in FY 2013. This is expected to increase operating costs for fishing vessels. There is the potential for a positive economic impact resulting from increased accuracy of landings data and thus more effective management, however this expected to be minimal given the redundancy of dealer reported data.

Sub-option 2 of DSM will remove DSM requirements all together and is therefore expected to decrease operating costs for sector vessels. If the removal of DSM reduces the accuracy of landings reporting, thus diminishing the effectiveness of other fishery regulations, then there could be negative economic impacts resulting from overfishing.

8.11.1.4.2.3 Commercial Fishery Minimum Size Restrictions

A detailed description of this alternative can be found in Section 4.2.3 of this document.

8.11.1.4.2.3.1 Option 1: No Action

This option will uphold the current size restrictions on commercially allocated groundfish species and therefore does not represent any new economic impact. Undersized fish that are caught will all become regulatory discards under this option.

8.11.1.4.2.3.2 Option 2: Changes to Minimum Size Limits (Preferred Alternative)

This option would lower the minimum size restrictions on commercially allocated groundfish species in order to reduce regulatory discards. Doing so would increase quota efficiency by allowing more fish to be landed for the same amount of quota expended under Option 1. This in turn would most likely lead to increased net trip revenues for sector vessels, assuming there are no major price effects or increased handling costs. It may be possible to quantify the fishing revenue impacts associated with this option by using observer data to estimate proportional discards by size for each species and then multiplying the ratio of discarded fish that are above the new size restrictions by total future estimated discards. Given time constraints this analysis is not currently feasible. See Section 7.4.3.3.2for a more detailed explanation. Common pool vessels are not expected to be directly affected by this regulation since they are still beholden to trip limits and are therefore incentivized to keep larger, more valuable fish. It is possible that there could be medium and long-term negative impacts to stock levels, if targeting behavior shifts to smaller fish, however restriction and approval measures are expected to mitigate this effect. A detailed discussion of potential changes in selectivity is provided in the economic analysis of Option 3 in Section 7.4.1.3.3 and is applicable here as well.

8.11.1.4.2.3.3 Option 3: Full Retention

This option would remove the minimum size restrictions completely, requiring all commercially allocated groundfish to be landed, regardless of size or quality. This option has the potential to increase net trip revenues for sector vessels, by increasing quota efficiency as with Option 2, but to a greater extent. A detailed economic analysis of this option is provided in Section 7.4.3.3.3 of this document. The upper bound revenue estimates from full retention under several ACL scenarios for FY 2013 are in the range of $2.45 million to $3.05 million and the lower bound estimates are in the range of $0.46 million to $0.56 million (Table 96). There is also potential for cost saving in terms of monitoring, since electronic monitoring could replace human labor under this option. As with option 2, the risk in adopting this regulation is potential changes to the targeting behavior of fishermen. This will depend on species and size-specific catch rates and price differentials, but could have long-term detrimental impacts on species MSY and recruitment, ultimately leading to lower landings down the line. See Section 7.4.3.3.3 for more information on potential changes to selectivity.

8.11.1.4.2.4GB Yellowtail Flounder Management Measures

A detailed description of this alternative can be found in Section 4.2.4 of this document. Any of the following options could be adopted. Options 2, and 3 could both be adopted at the same time, since Option 2 is only for FY 2013 and Option 3 does not have a time limit. If Option 3 is adopted by itself there would be no changes to the GB yellowtail flounder possession limits.

8.11.1.4.2.4.1 Option 1: No Action

Option 1 does not change the current discard rates used for GB yellowtail quota monitoring nor does it change the existing regulatory requirements for the small-mesh bottom-trawl fishery. No new economic impacts are expected.

8.11.1.4.2.4.2 Option 2: Revised Discard Strata for GB Yellowtail Flounder (Prefered Alternative)

As discussed in Section 7.4.3.4.2, Option 2 will modify the spatial stratification used to estimate discards for in-season quota monitoring. A separate discard rate will be calculated for statistical area 522 from all other GB yellowtail flounder statistical areas. Based on catch data, it is expected the discard rate for GB yellowtail flounder will decrease if calculated separately from the other statistical areas. This would allow more fishing to occur in area 522 increasing net revenues from the area. Large trawlers are expected to receive the greatest benefit since they are the ones that predominantly fish in area 522. By removing area 522 from the discard rate calculation of the other areas, it may cause a higher discard rate to be calculated for the other areas. This could have a few negative economic impacts. Vessels that fish in other areas will have to expend more quota than under Option 1 to land the same amount of fish. Also, effort could potentially shift into area 522 as it becomes relatively more profitable, which could have unforeseen impacts the MSY of certain species.

8.11.1.4.2.4.3 Option 3: Small-Mesh Fishery Bottom Trawl Gear Requirements

Option 3, which can be adopted on its own or in conjunction with Option 2, will require small mesh vessels on non-groundfish trips (not fishing on a groundfish DAS or sector trip) in statistical areas 522, 525, 561, or 562 to use trawl gear designed to minimize the catch of flounder species.

By reducing the flounder bycatch discards in the small-mesh fishery, it is less likely that overfishing will occur in these areas and catch rates of groundfish trips may increase slightly for groundfish vessels resulting in higher net revenue. Groundfish sub-ACLs could be increased slightly as a result of reduced discards.

The small-mesh fishermen would likely experience higher costs including the fixed cost of purchasing new gear/modifying existing gear. Their operating costs would probably increase as well due to the gear restrictions (lower catch rates) effectively lowering their net revenue and overall profitability.

8.11.1.4.2.5 Sector Management Provisions – Allowed Exemption Requests

A detailed description of this alternative can be found in Section 4.2.5 of this document. In previous actions, restrictions on sector exemptions were described in a section titled “Interaction with Common Pool Vessels.” This revised description is adopted for increased clarity.

8.11.1.4.2.5.1 Option 1: No Action

Option 1 will maintain the status quo. Sectors will not be able to request exemptions from year round closed areas. There are no new economic impacts expected.

8.11.1.4.2.5.2 Option 2: Exemption from Year-Round Mortality Closures (Preferred Alternative)

Option 2 will grant sectors the right to request exemptions from year-round mortality closures. It does not in and of itself grant access to non-habitat closed areas. As such the right to request an exemption has no real economic impact.

8.11.1.4.2.6Commercial Fishery Accountability Measures

A detailed description of this alternative can be found in Section 4.2.6. More than one alternative to Option 1/No Action can be selected from this section.

Option 1: No Action

Option 1 will retain current commercial fishery AMs as defined in Amendment 16. There are no new economic impacts expected.

8.11.1.4.2.6.1 Option 2: Change to AM Timing for Stocks Not Allocated To Sectors (Preferred Alternative)

Under Option 2, AMs for non-allocated stocks would go into effect at the start of the following fishing year from when an ACL overage was detected. This would allow AMs to happen faster than they have in the past, thus preventing further overfishing of non-allocated stocks in subsequent years. In the long run there is a positive stock impact expected from reducing consecutive years of overfishing, ultimately leading to higher MSY, ACLs, and catch rates. Under this option, AMs will not go into effect in-season, which will allow fishing businesses to better manage the timing of their harvests and thus maximize profits. Faster implementation of AMs could create short-term negative economic impacts since landings will become restricted sooner than they would have under Option 1.

8.11.1.4.2.6.2 Option 3: Area – Based Accountability Measures for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder (Preferred Alternative)

Section 7.3.2.7.3of this document contains a detailed economic impacts analysis for each of the proposed AMs. The impacts are summarized below.

Atlantic Halibut AM
If adopted, this option would (1) require the use of selective trawl gear in specified trawl halibut AM areas, (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear halibut AM areas, and (2) set a zero possession limit for all vessels. An estimated $5.5 million in gross revues came from the proposed AM area with trawl gears in FY 2010. Approximately 85% of the total revenue was landed by vessels with a home port of New Bedford, MA. Landings data suggests catch rates are about 15% higher using selective gear and that the mix of species is quite different than when using traditional gear, so it is not clear if the AM will have a negative economic impact or not. This would depend on the catch rates and cost of fishing with selective gear types inside the AM area as well as the catch rates and operating costs in substitute areas. Given the vast number of factors that affect effort re-distribution and

the spatial bias of VTR coordinates, it is not possible to quantify the net economic impact of this option currently.

Approximately $1 million in estimated revenues came from fixed gear trips reported fishing inside the fixed gear AM areas, with Chatham contributing the highest proportion. Since all fixed gear fishing activity will be displaced under this option from the closed AM areas, the net impact to revenue will depend on the catch rates and operating costs in substitute areas. Once again, given the vast number of factors that affect effort re-distribution and the spatial bias of VTR coordinates, it is not possible to quantify the net economic impact of this option currently.

Wolffish

If adopted, this option would (1) require the use of selective trawl gear in specified trawl wolffish AM areas, and (2) restrict entirely sink gillnet and longline vessel operation in specified fixed gear wolffish AM areas. An estimated $4 million in gross revenues came from the proposed wolffish trawl AM area. Approximately 85% of these came from Gloucester, MA. There is very little evidence of selective gear usage in the wolfish trawl AM area. It is difficult to quantify the net economic impact of a closure since it depends on whether fishermen continue to fish in the closed area using selective gear or choose to fish elsewhere.

Fixed gear vessels fishing out of Chatham had estimated revenues of nearly $1 million in FY 2010 inside the wolfish fixed-gear AM area. If this AM is triggered, this effort will be completely displaced but will likely re-distribute to other areas. It is not currently possible to estimate the net economic impact from this spatial shift in effort.

SNE/MA Windowpane Flounder

The analysis for this area-based AM has not been completed at this time.

8.11.1.4.2.6.3 Option 4: Modifications to the Accountability Measures for SNE/MA Windowpane Flounder (Preferred Alternative)

As discussed in Section 7.4.3.6.4, by distributing responsibility for overages across the groundfish and other sub-components fisheries, Option 4 is expected to increase the effectiveness of the AM. This will help prevent overfishing which will likely have positive long-term economic benefits for both the multispecies fishery and other fisheries that land windowpane flounder.

8.11.1.4.2.6.4 Option 5 : Revised HA and HB Permit Accountability Measures (Preferred Alternative)

Option 5 will revise the accountability measures for HA and HB permits, exempting common pool vessels using handgear or tub trawls from trimester TAC provisions for white hake. This will lower the costs of an overage to these permit holders, by not restricting their ability to fish for other target species when AMs are triggered. Assuming catch levels by these permit holders remain below 1% of total common pool white hake landings, exempting them from trimester TACs will have little negative economic impact in terms of overfishing.

8.11.1.4.2.7 Trawl Gear Stowage Requirements

A detailed description of this alternative can be found in Section 4.2.7 of this document.

8.11.1.4.2.7.1 Option 1 – No Action

Under Option 1, trawl gear stowage requirements will remain unchanged. There are no economic impacts expected.

8.11.1.4.2.7.2 Option 2 – Removal of Trawl Gear Stowage Requirements (Preferred Alternative)

Option 2 will remove the trawl gear stowage requirements for groundfish trawl trips. The impact of covering nets with tarps when transiting closed areas has very little pecuniary cost and is assumed not substantial enough to alter navigational course, so this option is expected to have very little economic impact. It will however have a positive impact on the safety of fishermen, especially in rough sea conditions. There may be a slight cost to the Coast Guard resulting from increased difficulty in assessing whether or not a vessel is fishing in a closed area. By removing gear stowage requirements it could cause the Coast Guard to have to repeat flyovers in order to observe trawl gear in use. VMS provides indication of when vessels are in a closed area but only average speed is calculated between VMS polls causing a delay in the notification of possible fishing activity (VMS/Enforcement meeting Sheraton Harborside Portsmouth, NH, 2011). Since VMS cannot explicitly determine whether or not a vessel is actively fishing, trawl gear stowage requirements still have some value in terms of monitoring, though the impact to fishermen safety may not justify their continuance.

8.11.1.5 Determination of Significance

The Preferred Alternatives/Proposed Action is not predicted to have an adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses in excess of $100 million. Many of the alternatives such as the revised status determination criteria, the scallop fishery and other sub-component sub-ACLs, and revisions to AMs will have impacts on the way that ACLs are set and managed, however it is the ACL values themselves that will dictate the likelihood of overages occurring and thus the impact on revenues and operating costs. Proposed ACL values for groundfish species are being treated as a separate regulation from FW 48.

8.11.2 Regulatory Flexibility Act

8.11.2.1 Introduction

The purpose of the Regulatory Flexibility Analysis (RFA) is to establish as 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 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 primary objectives of this action are set forth in Section 3.2 of this document and are incorporated herein by reference. In general, FW 48 is intended to modify management measures to ensure that overfishing does not occur, while at the same time achieving optimum yield (OY).

8.11.2.4 Description and estimate of the number of small entities to which the proposed rule will apply

The Small Business Administration (SBA) defines a small business as one that is:

- independently owned and operated
- not dominant in its field of operation
- has annual receipts not in excess of -
    - $4.0 million in the case of commercial harvesting entities, or
    - $7.0 million in the case of for-hire fishing entities
- or if it has fewer than -
    - 500 employees in the case of fish processors, or
    - 100 employees in the case of fish dealers.

This framework action impacts mainly commercial harvesting entities engaged in the limited access groundfish as well as both the limited access general category and limited access scallop fisheries.

Regulated Commercial Harvesting Entities

Limited Access groundfish harvesting permits
The limited access groundfish 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% 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. At the beginning of the 2012 Fishing Year (May 1, 2012) there were 1,382 individual limited access permits. Each of these was eligible to join a sector or enroll in the common pool. Alternatively they could also allow their permit to expire by failing to renew it. 827 permits were enrolled in the sector program and 584 were in the common pool.

Limited access scallop harvesting permits
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. At the beginning of the 2012 Fishing Year (March 1, 2012) there were 342 active LA scallop and 603 active LAGC permits.

Permit-level data are presented for illustrative purposes, with gross receipts averaged across CY 2010-2012.

Table 109 - Number of permits held in potentially impacted fisheries

Year	Total permits	Sector permits	Common Pool permits	Limited Access Scallop permits	Limited Access GC Scallop	Both Sector and LA Scallop permits	Both Sector and LGC Scallop permits	Both Common Pool and LA Scallop permits	Both Common Pool and LGC Scallop permits
2010	1916	747	709	343	649	26	239	24	88
2011	1845	804	607	336	613	31	227	25	81
2012	1838	827	584	342	603	35	232	23	77

Table 110 - Gross sales associated with potentially impacted permits

Gross sales category	Number permits	Median gross sales	Median gross sales of groundfish	Median gross sales of scallops
0	644	$0	$0	$0
<$50K	248	$12,143	$3,693	$0
$50-100K	105	$77,518	$15,876	$0
$100-500K	481	$211,653	$62,140	$446,383
$500K-1mil	134	$698,289	$166,705	$495,123
$1-4mil	384	$1,631,354	$194,572	$1,666,564
$4-10mil	26	$4,364,661	$1,002,113	$4,115,054

Ownership entities in regulated commercial harvesting businesses
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.

A note about Sectors as ownership entities in the groundfish fishery
Vessels electing to fish under the sector management system may join a sector where their individual allocations of stock-specific fishing quota (called "Potential Sector Contributions" or PSC) become pooled. Vessels individually do not have a right to catch their PSC--it becomes fishable quota (called Annual Catch Entitlement, or ACE) only when that vessel enrolls in a sector.

Section 3 of the Small Business Act defines affiliation as:

> Affiliation may arise among two or more persons with an identity of interest. Individuals or firms that have identical or substantially identical business or economic interests (such as family members, individuals or firms with common investments, or firms that are economically dependent through contractual or other relationships) may be treated as one party with such interests aggregated (13 CFR 121.103(f)).

An argument can be made that sectors themselves, and not individual vessels, are impacted by regulations pertaining to the groundfish fishery, especially those that adjust the PSC of individual vessels. For the purposes of this analysis, however, impacted entities will be defined at the ownership entity level and not at the sector level, for three reasons.

1. This proposed action does not directly adjust PSC or ACE for vessels or sectors, the primary driver of sector-level dependency.
2. While sector vessels have substantially identical business interests and are economically dependent on one another through their contractual relationship, many of those vessels—if not most—obtain harvesting receipts outside of the sector system by participating in non-groundfish fisheries. These receipts are not part of their respective sector's operations and in most cases lie outside of the contractual relationship established by the sector program.
3. Many ownership entities have interests inside and outside of the Sector program. Receipts from affiliated vessels that are otherwise unaffiliated with Sectors are difficult to disentangle.

A summary of regulated ownership entities within potentially impacted fisheries
Ownership data are available for the four primary sub-fisheries potentially impacted by the proposed action from 2010 onward. However, current data do not support a common ownership entity data field across years. For this reason only one year's gross receipts will be reported and calendar year 2011 will serve as the baseline year for this analysis. Calendar year 2012 data are not yet available in a fully audited form.

In 2011 there were 1,370 distinct ownership entities identified. Of these, 1,312 are categorized as small and 58 are large entities as per SBA guidelines.

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 either regulated groundfish or from scallops, we are able to identify those ownership groups most likely to be impacted by the proposed regulations. Using this threshold, we find that 135 entities are groundfish-dependent with 131 small and four large. We find that 47 entities are scallop-dependent with 39 small and 8 large.

Table 111 - Description of entities regulated by the Proposed Action

Sales	**Size standard**	**Number of ownership entities**	**Average number permits owned per entity**	**Maximum permits owned per entity**	**Median gross sales per entity**	**Average gross sales per entity**	**Average groundfish sales per entity**	**Average scallop sales per entity**
$0	small	448	1.1	35	$0	$0	$0	$0
<$50K	small	150	1.1	6	$11,809	$16,069	$6,467	$0
$50-100K	small	88	1.1	3	$77,698	$75,342	$18,221	$0
$100-500K	small	334	1.2	4	$222,265	$244,526	$97,889	$0
$500K-1mil	small	103	1.5	7	$680,218	$700,954	$278,618	$546,111
$1-4mil	small	189	1.9	8	$1,806,443	$2,030,334	$704,861	$1,777,724
$4mil+	large	58	7.0	36	$7,950,960	$10,753,380	$2,398,832	$5,137,942
Total ownership entities:		*1,370*						

Table 112 - Description of groundfish and scallop dependent entities regulated by the Proposed Action

Entity type	sales	Size standard	Number of ownership entities	Average number permits owned per entity	Maximum permits owned per entity	Median gross sales per entity	Average gross sales per entity	Average groundfish sales per entity	Average scallop sales per entity
Groundfish_dependent	<$50K	small	13	1.0	1	$7,944	$13,980	$10,827	$0
Groundfish_dependent	$50-100K	small	6	1.0	1	$81,481	$76,726	$58,902	$0
Groundfish_dependent	$100-500K	small	61	1.6	4	$245,176	$256,524	$205,415	$0
Groundfish_dependent	$500K-1mil	small	23	2.2	7	$791,387	$769,666	$564,253	$0
Groundfish_dependent	$1-4mil	small	28	3.1	8	$1,546,338	$1,636,644	$1,373,636	$0
Groundfish_dependent	$4mil+	large	4	4.8	8	$6,618,976	$6,984,382	$5,575,181	$2,005,277
Scallop_dependent	$500K-1mil	small	4	1.0	1	$711,928	$708,607	$0	$546,111
Scallop_dependent	$1-4mil	small	35	1.5	4	$1,975,662	$2,150,028	$204	$1,958,618
Scallop_dependent	$4mil+	large	8	6.6	13	$10,423,610	$11,075,904	$41,363	$7,292,324
		Groundfish dependent	*135*						
		Scallop dependent	*47*						
		Total dependent	*182*						

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 48 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

<u>Substantial number criterion</u>

In colloquial terms, substantial number refers to "more than a few." Given that the majority of entities in the groundfish and scallop industries, both at the permit and ownership entity level, earn less than $4 million annually, all of the proposed alternatives will have impacts on a substantial number of small entities.

<u>Significant economic impacts</u>

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.

The proposed action does not place small entities at a significant competitive disadvantage relative to large entities. Impacts on profits from the proposed action are likely to be small, and will not significantly reduce profits for a substantial number of small entities.

8.11.2.8 Description of significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities

This IRFA is intended to analyze the impacts of the alternatives described in Section 4.0 of FW 48 on small entities. These alternatives include revision of status determination criteria, modification of management measures for GB yellowtail flounder, modification of management measures for at-sea monitoring, allowance of exemption requests from sectors to year-round closures, changes to minimum size restrictions for allocated fish, and modifications to AMs. All of the alternatives have the potential to impact a large number of small entities and while some of the options may significantly alter profitability, it does not seem that any of them would be classified as disproportional. The term groundfish vessel will refer to vessels with limited access groundfish harvesting permits. The term scallop vessel will be used to refer to vessels with limited access scallop harvesting permits. The terms sector vessel and common pool vessel will be used throughout to refer to groundfish vessels that belong to a sector or are part of the common pool. It is assumed that all impacts to vessels are also applicable to ownership entities.

The alternative to adopt new status determination criteria will directly impact how allowable biological catch (ABC) for each species is set. These ABCs in turn will directly impact the ACLs and sub-ACLs for each species, which will ultimately determine the likelihood of overages and the net impact on profitability. If the revised status determination criteria result in much lower ACLs than under the no action option, this alternative will probably be significant in terms of a reduction in fishing revenues. In order to be consistent with the laws of the Magnusson-Stevens Act however it is necessary to incorporate the best use of science. Option 1, No Action, would continue to use out-dated stock assessment data and is therefore not the preferred option.

The sub-ACL provisions for SNE/MA windowpane flounder and for GB yellowtail flounder will impact both the groundfish and scallop fisheries by either shifting accountability for overages or changing the method of sub-ACL calculation. New SNE/MA windowpane sub-ACLs for the scallop and other sub-components fisheries are expected to lower overage uncertainty and reduce overfishing leading to lower operating costs and higher future revenues. The specific economic impacts to each respective fishery are dependent on the allocation received and details of the associated to-be-defined AMs. If sub-ACLs are set below average yearly landings for a given fishery and if AMs are severely restrictive, the impacted vessels could experience a substantial reduction in their profitability. As for modifications to the scallop fishery GB yellowtail flounder sub-ACL, the preferred option, Option 3, will use a fixed percentage of the GB yellowtail ABC to determine the allocation to the scallop fishery. In FY 2013 the percentage will be 40% and in subsequent years it will drop to 16% of the total ABC. Once again, the economic impacts to fishing businesses will depend on the overall GB yellowtail ABC and the probability of an overage based on the sub-ACL, both of which are currently unquantifiable. It seems likely that the 16% fixed rate for the scallop fishery sub-ACL will be quite prohibitive to maximizing the value from scallop landings. In the worst-case scenario, if an overage occurred that closed area CAII, the scallop industry could suffer a $16.9 million dollar loss in economic benefits. Option 2 to this alternative uses a set 90% of estimated scallop catch as the determinant of the scallop sub-ACL. Since the allocation method of Option 2 does not adjust for changes in the ABC, it could lead to a very low groundfish fishery sub-ACL for GB yellowtail. The small-mesh fishery sub-ACL for GB yellowtail alternative, which uses a fixed percentage of catch history to set the allocation, is expected to have similar impacts and unknowns to the aforementioned alternatives but with respect to the small-mesh groundfish vessels.

The provision to modify the groundfish program monitoring requirements will impact all sector vessels. The no action option under this alternative will have a significant impact on these vessels by making them responsible for the full ASM and DSM expenditures in FY 2013. As discussed in Section 7.4.1.2 of this document, had sector vessels absorbed the full ASM/DSM costs in FY 2011 they would have seen aggregate vessel owners' shares of net revenue decrease by a range of 2 to 12 percent and average net revenue per vessel decrease by a range of 1 to 12 percent. The highest percent reductions in net revenue were expected to occur in the 30 to 50 foot vessel category. Since profitability of individual vessels is unknown, it is not possible to estimate the effects of this option on participation levels, but it is likely that vessels operating close to the margin would be forced to exit the industry or lease their quota. Some of the preferred sub-options under Option 3 are designed to minimize the economic impact to sector vessels. Sub-Option B will provide short-term relief to sector vessels by delaying the industry-funded ASM until FY 2014. Sub-Option C will reduce or remove ASM coverage for a subset of groundfish trips, specifically those occurring under a monkfish DAS declaration in the SNE Broad Stock Area using ELM gillnet gear. This is expected to lower the costs of those trips and thus increase net revenues. Option 4, which is also identified as a preferred option, is intended to reduce the overall cost of ASM paid for by the industry. It will ensure that the industry is only responsible for the direct at-sea costs of the ASM program. The government will pay for all other programmatic costs associated with ASM indefinitely. In FY 2010, the direct at-sea costs accounted for approximately 75% of the total per day costs for ASM. Finally, the preferred alternative to remove DSM entirely in FY 2013 is expected to have a substantial positive economic impact on sector vessels by lowering operating costs and thus increasing profitability. The magnitude of this impact will vary with coverage rates and labor costs.

The provision to modify the minimum size restrictions for commercially allocated groundfish species is expected to significantly impact sector vessels as discussed in Section 7.4.3.3 of this document. The preferred option, Option 2, will lower the minimum size restrictions allowing a portion of previously wasted regulated discards to become landings. This option is expected to a positive economic impact on net trip revenues as more fish will be landed for the same amount of expended quota as under the no action alternative. A suggested methodology for modeling this economic impact is presented in Section 7.4.3.3.2, however resource constraints have impeded the analysis. Option 3, to the minimum size restrictions alternative would allow for full retention of caught groundfish species regardless of size or quality. A detailed economic analysis of this option is provided in Section 7.4.3.3.3 of this document. The upper bound revenue estimates from full retention under several ACL scenarios for FY 2013 are in the range of $2.45 million to $3.05 million and the lower bound estimates are in the range of $0.46 million to $0.56 million (Table 88). In addition, full retention could allow for electronic monitoring to replace human labor, which could reduce ASM costs. Option 2 is the preferred option, because it allows for increased revenues from slightly smaller fish, but will likely have less of an effect on the targeting behavior of fishing vessels than Option 3 would have. Under either Option 2 or Option 3, there could potentially be unforeseen consequences from targeting smaller fish that could have long-term negative impacts on future landings and revenue. Gear restrictions will help to mitigate some of this effect.

The alternative to modify the GB yellowtail flounder management measures is potentially significant, since it may substantially impact the profitability of small-mesh vessels. Option 3 to this alternative would require small-mesh vessels use gear types that minimize the catch of flounder species. As a result, these groundfish vessels may experience higher fixed costs associated with gear purchase or modification to existing gears. Given that the new gear types will likely result in a different mix of species landed, revenues could potentially decline as well.

Option 2, the preferred alternative, will modify the discard strata in federal statistical area 522, which has potential positive impacts on revenue for large trawl vessels that predominantly fish this area. Conversely, vessels that fish in the remaining areas may experience reduced profitability as a result of higher discard rates. See Section 7.4.3.4.2 for more information.

The final alternative considered to be significant by the IRFA criteria is the modification of commercial fishery AMs. Option 2, which will modify the timing of AMs for stocks not-allocated to sectors will help to prevent overfishing which could create long-term positive impacts in terms of landings for those species. Under this option, AMs will no longer go into effect mid-season, which will be beneficial to business planning. There is however the potential for short-term decreases in revenue based on faster implementation of AMs. Option 3 will create area –based AMs for Atlantic Halibut, Atlantic Wolffish, and SNE/MA Winter Flounder. In the event these AMs are triggered, trawl vessels will be forced to use selective gears within designated closure areas and fixed gear vessels will be forced to cease fishing entirely inside designated closure areas. There is a detailed analysis provided in Section 7.4.3.6.3 of this document. The analysis provides estimates of aggregate landings for the proposed closure areas by gear type using VTR and observer data, but these figures do not account for effort re-distribution. The closed areas for halibut and wolfish generated estimated revenues in the range of $4 million to $5 million dollars in FY 2010 for trawl vessels and around $1 million for fixed gear vessels. Given the vast number of factors that affect effort re-distribution and the spatial bias of VTR coordinates, it is not possible to quantify the net economic impact of this option currently. Option 5 would exempt common pool vessels using handgear or tub trawls from trimester TAC provisions for white hake, allowing them to continue fishing in closed areas. Depending on catch rates in the closed areas, the cost of fishing elsewhere, and the likelihood of AMs being triggered, this could increase revenues over the no action alternative.

9.0 References

9.1 Glossary

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect: Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation: A group of animals or plants occurring together in a particular location or region.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anaerobic sediment: Sediment characterized by the absence of free oxygen.

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Annual Catch Entitlement (ACE): Pounds of available catch that can be harvested by a particular sector. Based on the total PSC for the permits that join the sector.

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship
S=1-A.

ASPIC (A Surplus Production Model Incorporating Covariates): A non-equilibrium surplus production model developed by Prager (1995). ASPIC was frequently used by the Overfishing Definition Panel to define B_{MSY} and F_{MSY} reference points. The model output was also used to estimate rebuilding timeframes for the Amendment 9 control rules.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g, within the sand or mud found on the bottom. See *Benthic infauna*, below)

Benthic infauna: See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g, coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1^+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

B_{MSY}: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

$B_{threshold}$: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B_{target} as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, $B_{threshold}$ is often defined as either $1/2B_{MSY}$ or 1/4 B_{MSY}. $B_{threshold}$ is also known as $B_{minimum}$.

B_{target}: A desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1^+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3^+ biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (B_{MSY} or proxy) as a management objective. The biomass threshold ($B_{threshold}$ or B_{min}) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.

Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See *Epifauna*. Animals living upon the bottom that extend a certain distance above the surface.

Epifauna: See *Benthic infauna*. *Epifauna* are animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Exploitation pattern: Describes the fishing mortality at age as a proportion of fully recruited F (full vulnerability to the fishery). Ages that are fully vulnerable experience 100% of the fully recruited F and are termed fully recruited. Ages that are only partially vulnerable experience a fraction of the fully recruited F and are termed partially recruited. Ages that are not vulnerable to the fishery (including discards) experience no mortality and are considered pre-recruits. Also known as the partial recruitment pattern, partial recruitment vector or fishery selectivity.

Exploitation rate (u): The fraction of fish in the exploitable population killed during the year by fishing. This is an annual rate compared to F, which is an instantaneous rate. For example, if a population has 1,000,000 fish large enough to be caught and 550,000 are caught (landed and discarded) then the exploitation rate is 55%.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

$F_{0.1}$: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

F_{MAX}: a fishing mortality rate that maximizes yield per recruit. F_{MAX} is less conservative than $F_{0.1}$.

F_{MSY}: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

$F_{threshold}$: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses F_{MSY} or F_{MSY} proxy for $F_{threshold.}$ 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Furrow: A trench in the earth made by a plow; something that resembles the track of a plow, as a marked narrow depression; a groove with raised edges.

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Growth overfishing: Fishing at an exploitation rate or at an age at entry that reduces potential yields from a cohort but does not reduce reproductive output (see recruitment overfishing).

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with *structure-forming organisms*, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush-like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Immobile epifaunal species: See *epifauna*. Animals living on the surface of the bottom substrate that, for the most part, remain in one place.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Land runoff: The part of precipitation, snowmelt, or irrigation water that reaches streams (and thence the sea) by flowing over the ground, or the portion of rain or snow that does not percolate into the ground and is discharged into streams instead.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Lethrinids: Fish of the genus *Lethrinus*, commonly called emperors or nor'west snapper, are found mainly in Australia's northern tropical waters. Distinctive features of Lethrinids include thick lips, robust canine teeth at the front of the jaws, molar-like teeth at the side of the jaws and cheeks without scales. Lethrinids are carnivorous bottom-feeding fish with large, strong jaws.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See *Benthic community* and *Benthic infauna*. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A_{50} is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1^+ mean biomass; mean biomass summed across ages 3 and over is 3^+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L_{25} is the length where 25% of the fish encountered are retained by the mesh. L_{50} is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See *Commensalism*. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See *Polychaetes*. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Planktivore: An animal that feeds on plankton.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Porosity: The amount of free space in a volume of a material; e.g. the space that is filled by water between sediment particles in a cubic centimeter of seabed sediment.

Possession-limit-only permit: an open-access permit (see above) that restricts the amount of multispecies a vessel may retain (currently 500 pounds of "regulated species").

Potential Sector Contribution (PSC): The percentage of the available catch a limited access permit is entitled to after joining a sector. Based on landings history as defined in Amendment 16. The sum of the PSC's in a sector is multiplied by the groundfish sub-ACL to get the ACE for the sector.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Recovery time: The period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. "Recruitment" also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation: an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Retrospective pattern: A pattern of systematic over-estimation or underestimation of terminal year estimates of stock size, biomass or fishing mortality compared to that estimate for that same year when it occurs in pre-terminal years.

Riverine area: The area of a river and its banks.

Saurids: Fish of the family Scomberesocidae, the sauries or needlefishes. Distribution: tropical and temperate waters.

Scavenging species: An animal that consumes dead organic material.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedentary: See *Motile* and *Mobile organisms*. Not moving. Organisms that spend the majority of their lives in one place.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See *adult stage*. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be “highly” or “moderately” vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats.*

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). B_{MSY} is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, F_{MSY}, B_{MSY}, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Total mortality: The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Trophic guild: Trophic is defined as the feeding level within a system that an organism occupies; e.g., predator, herbivore. A guild is defined as a group of species that exploit the same class of environmental resources in a similar way. The trophic guild is a utilitarian concept covering both structure and organization that exists between the structural categories of trophic groups and species.

Turbidity: Relative water clarity; a measurement of the extent to which light passing through water is reduced due to suspended materials.

Two-bin (displacement) model: a model used to estimate the effects of area closures. This model assumes that effort from the closed areas (first bin) is displaced to the open areas (second bin). The total effort in the system is then applied to the landings-per-unit-effort (LPUE) in open areas to obtain a projected catch. The percent reduction in catch is calculated as a net result.

Vulnerability: In order to evaluate the potential adverse effects of fishing on EFH, the vulnerability of each species EFH was determined. This analysis defines vulnerability as the likelihood that the functional value of EFH would be adversely affected as a result of fishing with different gear types. A number of criteria were considered in the evaluation of the vulnerability of EFH for each life stage including factors like the function of habitat for shelter, food and/or reproduction.

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the “birth date” is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., Z = F+M)

Zooplankton: See *Phytoplankton.* Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

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