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

MAR 16 2010

To All Interested Government Agencies and Public Groups:

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

TITLE: Framework Adjustment 44 to the Northeast Multispecies Fishery Management Plan

LOCATION: Exclusive economic zone off the U.S. East Coast.

SUMMARY: Framework Adjustment 44 will implement trip limits to control fishing mortality on two stocks, provide additional authority to the NOAA Fisheries Service (National Marine Fisheries Service) Regional Administrator, Northeast Region, to prevent annual catch limits from being exceeded, and specify catch levels for fishing years 2010 through 2012.

RESPONSIBLE OFFICIAL: George H. Darcy
Assistant Regional Administrator for Sustainable Fisheries
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930-2276
(978) 281-9315

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

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

Sincerely,

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

Enclosure

Framework Adjustment 44
to the
Northeast Multispecies
Fishery Management Plan

Including an

Environmental Assessment
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

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

Initial framework meeting: September 23, 2009
Final framework meeting: November 18, 2009
Date submitted: January 15, 2010

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1.0 EXECUTIVE SUMMARY

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (M-S Act). The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts. The FMPs have been updated through a series of amendments and framework adjustments. The most recent multispecies amendment, published as Amendment 16, was submitted for review by the National Marine Fisheries Service in October 2009 and if approved will become 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. This action is the result of that decision.

Amendment 16 included several major changes to the FMP. For several groundfish stocks, the mortality targets adopted by Amendment 16 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 measures that will selectively change mortality 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 is 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.

Because of a large amount of uncertainty over sector membership and other information, the Council determined that to the extent fishing behavior changes in ways not predicted by the analytic tools used to analyze Amendment 16 measures, there may be less certainty about achieving the mortality objectives of Amendment 16 if the management measures are not changed. This Framework to the FMP is therefore proposed to adopt modifications that will provide greater certainty mortality targets will be met, in addition to setting specifications for the fishery in Fishing Years 2010 through 2012. It is intended to be implemented on May 1, 2010, concurrently with the implementation of Amendment 16.

Proposed Action

This action implements a range of measures designed to determined specifications for the fishery and modify effort control measures to achieve mortality targets. Details of the measures summarized below can be found in section 3.0. The measures being considered associated with changes to management of the fishery include:

- *Annual Catch Limit specifications:* ACLs are adopted for each managed stock for Fishing Years 2010 through 2012. Acceptable Biological Catch (ABC) figures are adopted based on stock status developed by the Northeast Fisheries Science Center, and the ACLs are calculated after the ABCs are appropriately adjusted for management uncertainty. The ACL, ABC, and overfishing level for each stock is presented in Table 2.

- *Yellowtail Flounder Allocation to the scallop fishery:* The scallop fishery will receive an allocation of 100% of the yellowtail flounder that is projected to be necessary to fully harvest the scallop ACL in FY 2010, and 90% of what is projected to be necessary in FY 2011 and 2012.

- *U.S./Canada Resource Sharing Understanding TACs:* hard TACs for the U.S./Canada Management Area are specified for FY 2010.

- *Commercial Fishery Effort Control Modification*: Effort control measures for common pool vessels are modified because of uncertainty over future sector membership and the possibility that fishing behavior may change in ways not predicted by the analytic tools used to develop Amendment 16.

  - The following *trip limits* are adopted:
    - GOM cod 800 lbs. per DAS and 4,000 lbs. Handgear A permits will have a trip limit of 300 lbs., while Handgear B permits will be limited to 75 lbs. per trip
    - GOM pollock 1,000 lbs. per DAS, and 10,000 lbs. per trip.
    - For scallop fishery boats only, there will be no trip limit for yellowtail flounder. Limited access scallop vessels will be required to land all legal-sized yellowtail flounder that is caught.

  - *In-season modifications by the RA:* The Regional Administrator of the National Marine Fisheries Service (NMFS) will have the authority to modify effort control measures, including possession limits and DAS counting rates, at any time during the year to increase the likelihood that ACLs will be met and not exceeded.

Summary of Environmental Consequences
The environmental impacts of this action are discussed in detail in section 6.0. Estimating the impacts of the Proposed Action is difficult because of the continuing uncertainty over membership in sectors, as measures will affect sector and common pool members differently. The overall impacts will depend on how many vessels choose to operate in each. While there is a current estimate of the number of vessels that will be in sectors, the final actual number will not be known until the start of Fishing Year 2010 (FY 2010) because vessels can choose to fish outside of sectors until that date. Notwithstanding such uncertainty, both the sectors and common pool components of the fishery will be subject to management measures that the analysis indicates will be effective in controlling fishing effort. The effort control measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks and initiated stock rebuilding. The specifications were anticipated by Amendment 16 and results of the GARM III. While there is a degree of uncertainty over how fishermen will react to the 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. The implementation of catch limits at levels set to take into account scientific and management uncertainty decreases the likelihood that overfishing will occur.

Biological impacts are described in section 7.2, impacts on endangered and other protected species are described in section 7.3, impacts on essential fish habitat are described in section 7.4, the economic impacts are described in section 7.5, and social impacts are described in section 7.6. Cumulative effects are described in section 7.8. Summaries of the impacts are provided in the following paragraphs.

Biological Impacts

The measures that constitute the Proposed Action are designed to achieve the rebuilding objectives for the Northeast Multispecies fishery. The most important biological impact of the proposed measures is that they will control fishing mortality on Northeast Multispecies stocks in order to prevent (or end) overfishing and rebuild overfished stocks. The critical measures for these impacts are the specification of ACLs, and the modifications to trip limits and in-season adjustments for common pool effort controls.

Essential Fish Habitat (EFH) Impacts
No adverse impacts on EFH are expected to result from the Proposed Action. Impacts are expected to be neutral, and the overall reduction in effort expected as a result of this action and Amendment 16 is expected to benefit habitat by reducing the interaction of groundfish fishing vessels with EFH.

Impacts on Endangered and Other Protected Species
None of the measures proposed in Framework 44 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 beneficial as a result of overall reductions in groundfish fishing effort resulting from the specifications in this framework in conjunction with Amendment 16 measures.

Economic Impacts
The setting of specifications for the multispecies fishery will cap the potential revenue that can be earned by vessels fishing under the federal management plan. These vessels account for more than 95 percent of total groundfish revenue for most stocks. Using average FY 2007 and 2008 prices and assuming the entire commercial ACL is landed, the potential revenues from the proposed ACLs are $198.5 million in FY 2010, increase to $216.5 million in FY 2011, and decline to $206.8 million in FY 2012 (Table 88). These revenues are highly dependent on landings of GB haddock, which account for more than half the total revenues and is the reason why estimated potential revenues decline in 2012 as the contribution of the 2003 year to fishing revenue is diminishing. As discussed in section 3.1.1, the ABCs for GB cod and GB haddock assume no Canadian catch in 2011 and 212, so these estimates are biased high, but are believed to fall within the range expected impacts.

As noted above it is unlikely that the entire ACL will be harvested particularly for GB haddock due to its large stock size and also because of discarding. It is more realistic to assume GB haddock landings may increase from current levels, but the entire ACL will not be harvested since the ACL is several times larger than any recent landings amount. Approximation of potential revenues is complicated by the fact that vessel owners fishing in sectors formed under Amendment 16 may be expected to have an incentive to fish in a more selective manner than may have been the case in the past. When all of these factors are considered, there is a potential reduction in groundfish revenue of approximately $6 million per year to $63 million in 2010, $69.2 million in 2012, and $70.2 million in 2012. With exemptions from trip limits provided to each sector the discard rates experienced during FY 2007 and 2008 may not be realized. Assuming a 50% increase in TAC utilization results in estimated potential groundfish revenues of $87.2 million in FY 2010, $96.1 million in 2011, and $97.4 million in 2012.

Allocating yellowtail flounder to the scallop fishery may limit fishing revenues, particularly in FY 2011 and 2012 when the scallop fishery will be subject to AMs if too much yellowtail flounder is caught. Allocating 90 percent of the expected yellowtail flounder catch in GB and SNE/MA may reduce scallop vessels revenues by $35 to $36 million for FY 2011 – FY 2012. This ranges from 6% to 7% of forecast scallop revenues. In FY 2010 there aren't expected to be any revenue changes realized by the scallop fishery since there is no specific allocation and no specific measures that limit overall scallop fishing if the yellowtail flounder allocation is exceeded. The Council may consider a measure in Scallop Amendment 15 that adjusts FY 2011 or FY 2012 allocations if the scallop fishery exceeds the amount estimated for FY 2010, but that measure has not yet been designed.

The Proposed Action included modifications to effort controls (GOM cod and pollock trip limits) that will affect any vessels that choose to fish in the common pool. Estimating economic impacts is difficult because sector rosters are not yet known. For the permits that are committed to the common pool as of September 1, 2009, the combination of Amendment 16 and FW 44 measures are expected to reduce total revenues by 20.6% ($5.1 million), and groundfish revenues by 69%. Most of these reductions are due to the Amendment 16 changes in DAS and the application of the 24-hour clock. The pollock trip limit has few impacts since only 36 of the 279 permits with DAS landed any pollock in FY 2007, and only 8 landed amounts that exceed the proposed trip limit. The revised trip limits may also encourage more vessels to remain committed to sectors.

The Proposed Action also authorizes in-season changes to trip limits and DAS counting. These changes increase the uncertainty faced by common-pool fishermen as they attempt to create a business plan for each fishing year. These changes may also contribute to a derby fishery if fishermen decide to fish as much as possible prior to any change made in-season.

Social Impacts
The Proposed Action is not expected to have major social impacts. The specifications are most likely to change attitudes about management than any other social impact factor, but these changes are likely to be minimal since the specifications were anticipated by Amendment 16. The imposition of trip limits on several stocks is likely to increase regulatory discarding, but that measure is seen to have less social effects than the differential DAS counting alternative.

Cumulative Effects
The Proposed Action is expected to have beneficial effects for managed resources. Adopting fishery specifications and modifying effort controls should increase the likelihood of achieving mortality targets and lead to increased stock sizes. The measures are not expected to have substantial cumulative effects on non-target species, protected resources, or habitat (including essential fish habitat). While fishery specifications are not expected to have impacts on human communities when compared to the No Action alternative, modifying effort controls is expected to have negative impacts on communities. These changes reduce potential revenues for those permits that remain in the common pool and will also increase uncertainty over the regulations since changes can be made to trip limits and DAS counting at any time during the year.

Alternatives to the Proposed Action
For measure that is proposed, the Council considered the No Action alternative. Many other alternatives or options were considered for each element. These are briefly described below.

- *Yellowtail flounder allocation of 100% in FY 2010*: Under this alternative, the scallop fishery would have received an allocation of 90% of the yellowtail flounder that is projected to be necessary to fully harvest the scallop ACL in FY 2010 – 2012.

- *Differential DAS Counting*: This alternative would have imposed a 2:1 differential DAS counting area in the inshore Gulf of Maine.

Impacts of Alternatives to the Proposed Action
In most cases, the No Action alternatives would not have met current requirements of the M-S Act. Specific impacts are described in section 7.0. Only the most significant biological and economic impacts are highlighted below.

Biological Impacts
The biological impacts of the No Action alternatives are likely to be that mortality targets are exceeded for several stocks. Impacts of the 90% yellowtail flounder allocation in 2010 are similar to the Proposed Action. The differential DAS alternative would reduce fishing effort in the inshore Gulf of Maine by half, which would presumably reduce mortality, but precise effects are difficult to determine due to lack of information about sector membership.

Essential Fish Habitat Impacts
Overall, the indirect impacts of this No Action alternative are expected to be minor, and may be negative. The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on essential fish habitat. As the No Action alternative is defined, the ACLs would be set at the ABC level which would allow for slightly larger catches to be taken by the groundfish fishery. So indirectly, when compared to the Proposed Action, this option could lead to a very minor increase in fishing effort and increase the interactions of groundfish fishing gear with EFH in FY 2010.

The No Action alternative also does not specify a specific allocation of yellowtail flounder for the groundfish and scallop fisheries. When compared to the Proposed Action, this could lead to an increase in scallop fishing activity in FY 2011 and FY 2012 in the areas outside the CAI, CAII, and NLCA access areas, since fishing in these areas would still be limited by the cap. This might result in increased interactions between EFH and scallop dredge activity, but ultimately these interactions would be consistent with the analysis of impacts in the scallop management actions.

If U.S./Canada TACs are not specified, there may be changes in the distribution of fishing activity on GB. In recent years the TACs have occasionally restricted access to the Eastern U.S./Canada area; without the TACs, these restrictions would not be implemented and as a result there may be more fishing effort in the eastern area. It is not clear whether catch rates in the eastern area would be higher than in the western area, leading to more fish being caught with less effort.

The CAI Hook Gear Haddock SAP TACs would be the same under No Action as in the Proposed Action. This measure is largely administrative in nature and no impacts on EFH are anticipated.

Under this option, the effort control measures that are proposed in Amendment 16 would remain in effect and would not be changed. The impacts on EFH are described in that action. No changes would be expected.

An option considered adopting differential DAS at the rate of 2:1 for an area in the inshore GOM. Imposing this rate in the inshore GOM area may reduce effort in that area, but the effort could shift into other areas as a result. Overall, this measure may have provided minor, positive impacts for habitat in the inshore GOM area.

Impacts on Endangered and Other Protected Species
The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on protected species. The No Action alternative also does not specify a specific allocation of yellowtail flounder for the groundfish and scallop fisheries. Without an overall cap on yellowtail flounder catches, scallop fishing activity would not be constrained by yellowtail flounder catches. When compared to the Proposed Action, this could lead to an increase in scallop fishing activity in FY 2011 and FY 2012 in the areas outside the CAI, CAII, and NLCA access areas. The impact may be therefore be slightly stronger and negative on both sea turtles, as they are most likely to interact with scallop dredges, but such an outcome is uncertain and unpredictable at this time.

If U.S./Canada TACs are not specified, there may be changes in the distribution of fishing activity on GB. The impact of the change in distribution on protected species, however, depends on the gear used and the time and area in which the fishery occurs relative to the presence/absence of protected species, which cannot be predicted with any certainty at this time.

The CAI Hook Gear Haddock SAP TACs would be the same under No Action as in the Proposed Action. This measure is largely administrative in nature and no impacts on protected species are anticipated.

This option differs slightly from the Proposed Action in that GB and SNE/MA yellowtail flounder allocated to the scallop fishery in FY 2010 is 90 percent of the amount expected to be caught, rather than 100 percent. Because this value does not trigger a specific AM in FY 2010 and is only marginally smaller than that proposed, the protected species impacts of this option would be expected to be indistinguishable from those described for the Proposed Action.

Overall, the indirect impacts of this No Action alternative (for specifications) are expected to be minor, and may be slightly negative, although in all cases there is a high degree of uncertainty around the negative predictions.

This option proposed to adopt differential DAS counting at the rate of 2:1 for an area in the inshore GOM in order to reduce catches of GOM cod and pollock by vessels that do not join sectors. Overall the reductions in DAS reduce groundfish fishing and, by extension, the impact on protected species could be positive, as the chance of interaction with the fishery could decrease. There could be some drawbacks to this option, however. On one hand the effort could shift into other areas as a result of the option, more specifically out of the differential counting areas in the inshore GOM to elsewhere. A second factor limiting the potential benefits to protected species of this measure is that it only applies to vessels that choose to remain in the common pool; based on September 1, 2009 sector rosters, this is likely to be only a small number of active fishing vessels. Overall, this measure may or may not effect protected species in the inshore GOM area, depending how fishing behavior changes as a result; such changes at this time are unpredictable. The overall reduction does have the potential to be beneficial to protected species, however.

Economic Impacts
Allocating 90% of the yellowtail flounder necessary to the scallop fleet in 2010 would likely not have any economic effect, since there is no AM on the scallop fleet in 2010 so nothing restricts catch to the ACL. Differential DAS counting in the Gulf of Maine would be expected to decrease revenues over the No Action alternative, but its exact economic impacts would depend on sector membership during the fishing year.

Social Impacts
The No Action alternative for specifications, if adopted, would entail the failure by the Council to adopt ACLs for the fishery and, as a result, implementation of ACLs by NMFS, as well as a lack of TACs for the U.S./Canada area and no special allocation of yellowtail flounder to the scallop fishery. The social impacts caused by the implementation of Amendment 16 would not be changed.

Under the No Action alternative, the effort control measures adopted by Amendment 16 would apply to common-pool groundfish fishing vessels – that is, those that do not join a sector. These measures were evaluated in Amendment 16 to determine the social impacts. No Action could lead more people to be in the common pool in comparison with the other alternatives. Since sectors were projected to have primarily positive social impacts, especially in the long-term, it can be assumed that the No Action alternative will lead to fewer long-term positive impacts.

2.0 CONTENTS

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2.4 List of Acronyms

ACE	Annual Catch Entitlement
ALWTRP	Atlantic Large Whale Take Reduction Plan
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
CAI	Closed Area I
CAII	Closed Area II
CASA	Catch at Size Analysis (scallop assessment model)
CC	Cape Cod
CPUE	catch per unit of effort
DAM	Dynamic Area Management
DAS	days-at-sea
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
EA	Environmental Assessment
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
FW	framework
FY	fishing year
GAMS	General Algebraic Modeling System
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
GRT	gross registered tons/tonnage
HAPC	habitat area of particular concern
HPTRP	Harbor Porpoise Take Reduction Plan
I/O	input/output
IFQ	individual fishing quota
ITQ	individual transferable quota
IVR	interactive voice response reporting system
IWC	International Whaling Commission

LOA	letter of authorization
LPUE	landings per unit of effort
MA	Mid-Atlantic
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MARFIN	Marine Fisheries Initiative
MEY	maximum economic yield
MMC	Multispecies Monitoring Committee
MMPA	Marine Mammal Protection Act
MPA	marine protected area
MRFSS	Marine Recreational Fishery Statistics Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSMC	Multispecies Monitoring Committee
MSY	maximum sustainable yield
NAA	No Action Alternative
NAPA	National Academy of Public Administration
NAS	National Academy of Sciences
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NFMA	Northern Fishery Management Area (monkfish)
NLCA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NSTC	Northern Shrimp Technical Committee
NT	net tonnage
NWA	Northwest Atlantic
OBDBS	Observer database system
OLE	Office for Law Enforcement (NMFS)
OY	optimum yield
PBR	Potential Biological Removal
PSC	Potential Sector Contribution
PDT	Plan Development Team
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
RFA	Regulatory Flexibility Act
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
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
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	Social Science Committee
TAC	total allowable catch
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
TSB	total stock biomass
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system
VPA	virtual population analysis
VTR	vessel trip report
WGOM	Western Gulf of Maine
WO	weighout
YPR	yield per recruit

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3.0 INTRODUCTION AND BACKGROUND

3.1 Background

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

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

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

The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, yellowtail flounder, ocean pout, and Atlantic wolffish) off the New England and Mid-Atlantic coasts. Some of these species are sub-divided into individual stocks that are attributed to different geographic areas. Commercial and recreational fishermen harvest these species. The FMP has been updated through a series of amendments and framework adjustments. The most recent amendment, published as Amendment 16, was submitted to the National Marine Fisheries Service in October, 2009 and will become effective on May 1, 2010. This amendment adopted a broad suite of management measures in order to achieve fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act.

Amendment 16 adopted a process for setting Annual Catch Limits that requires catch levels to be set in biennial specifications packages. This framework is intended to adopt such specifications for regulated Northeast multispecies stocks, as well as stocks managed by the U.S./Canada Resource Sharing Agreement. It is also being used to incorporate the best available information in order to evaluate effort control measures adopted in Amendment 16.

3.2 Purpose and Need for the Action

The Northeast Multispecies FMP requires that the NMFS Regional Administrator, after consultation with the Council, determine the specifications for the groundfish fishery. The FMP requires the Council and the Regional Administrator to review the best available information regarding the status of the resource and fishery and develop appropriate fishery specifications. Amendment 16 allows for three-year specifications, as proposed in this document.

Previous amendments to the FMP established processes to evaluate fishing mortality and rebuilding progress. If necessary as a result of these evaluations, periodic framework adjustments were planned to facilitate any changes to the management program that may prove necessary in order to comply with the rebuilding programs and to provide an opportunity to adjust other management measures as necessary.

The proposed adjustments address two **needs**: to set specifications for ACLs in Fishing Years 2010-2012, and to modify management measures in order to ensure that overfishing does not occur. One **purpose** of this framework adjustment is to establish specifications for the Northeast multispecies fishery during the 2010-2012 fishing years. The other **purpose** is to adopt modifications to common pool effort control measures implemented by Amendment 16 so that the benefits from those measures are realized, and to facilitate the achievement of mortality and rebuilding targets in the fishery.

The specifications and adjustments to Amendment 16 are intended to meet the goal and many of the objectives of the Northeast Multispecies FMP, as modified in Amendment 16, specifically:

Need	***Purpose***
Set specifications for ACLs in Fishing Years 2010-2012 consistent with the ABC control rules adopted in Amendment 16 to the Northeast Multispecies FMP	• Measures to adopt ACLs, including incidental catch TACs • Measures to adopt TACs for U.S./Canada area
Modify management measures in order to ensure that overfishing does not occur consistent with the status of stocks, the National Standard guidelines, and the requirements of the MSA of 2006	• Implement changes to trip limits for common pool vessels • Implement changes to differential DAS counting for common pool vessels • Enhance the RA's authority to modify effort control measures in-season to reduce the likelihood of exceeding ACLs
Minimize, to the extent practicable, the adverse effects of fishing on essential fish habitat to comply with section 303(a)(7) of the Magnuson-Stevens Act	• Identify other actions to encourage the conservation and enhancement of EFH.

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. Since 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. A more detailed description of the history of the FMP is included in Amendment 16.

3.4 National Environmental Policy Act (NEPA)

NEPA provides a structure for identifying and evaluating the full spectrum of environmental issues associated with Federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is a combined framework adjustment to a fishery management plan and an environmental assessment (EA). An EA provides an analysis of a Proposed Action, the alternatives to that action that were considered, and the impacts of the action and the alternatives. An EA is prepared rather than an Environmental Impact Statement (EIS) when the environmental impacts are not expected to be significant. The required NEPA elements for an EA are discussed in section 7.2.1. The evaluation that this action will not have significant impacts is in section 7.2.2, and the required Finding of No Significant Impact (FONSI) statement is included at the end of that section.

3.5 Possible Changes to Yellowtail Flounder Annual Catch Limits

The Council approved FW 44 for submission on November 18, 2009. As described in the Proposed Action (section 3.1.1.1), FW 44 includes an allocation of GB and SNE/MA yellowtail flounder to the scallop fishery that is based on the amount of yellowtail flounder that fishery is expected to harvest under a specified scallop management program. This allocation was based on the scallop management program adopted that same day for Framework Adjustment 21 to the Atlantic Sea Scallop Fishery Management Plan.

Subsequent to those decisions, the Council scheduled a January 27, 2010 review and possible reconsideration of Scallop Framework 21 measures. The outcomes of this review are uncertain. If the Council changes the scallop management action, it may also revise the allocations of GB and SNE/MA yellowtail flounder to the scallop fishery. Even if the allocations are not changed, a modification of the scallop management program could change the impacts of the yellowtail flounder allocations so that they are different than described in this document. Once the Council's decision is known, FW 44 and its EA will be evaluated to determine if supplementary information is needed to reflect any changes to scallop management that may are made.

If a change is made to the scallop management program, broadly speaking thee are two choices for the yellowtail flounder allocation between the two fisheries. Either the amount (metric tons) of yellowtail flounder allocated to the scallop fishery could remain the same, or the amount could change. It seems unlikely that the amount allocated would be reduced, so any change is more likely to reflect an increase of yellowtail flounder to the scallop fishery and a decrease for the groundfish fishery. Table 1 provides a qualitative overview of the relative impacts of these choices. It should be noted the comparisons are to the impacts estimated in FW 44 in order to reflect how a different scallop management program would lead to different impacts.

Table 1 – Qualitative summary of possible impacts of a change in the allocation of yellowtail flounder to the scallop and groundfish fisheries as a result of a change in the scallop management program

Management Measure		**VECs**				
		Managed Groundfish Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
INCREASED SCALLOP HARVEST	YELLOWTAIL FLOUNDER ALLOCATION (WEIGHT) TO THE SCALLOP FISHERY REMAINS THE SAME	Negative (2010) – Increases risk GB and SNE/MA YTF may be exceeded since scallop fishery catches of YTF not controlled directly by AM Neutral (2011 and 2012) – AMs on both scallop and groundfish fisheries should control catch to ACL	Neutral (2010) Positive (2011 and 2012) – May reduce catches of scallops, other species caught by scallop vessels if allocation restricts scallop fishery	Mixed/Positive – May marginally reduce scallop dredge effort (compared to FW 44) if yellowtail flounder allocation restricts fishery	No Impact/Neutral – provided rebuilding continues, additional impacts to habitat are not anticipated	Mixed – No impact on groundfish fishery, but may constrain scallop catches and reduce scallop revenues in 2011 and 2012
	YELLOWTAIL FLOUNDER ALLOCATION (WEIGHT) TO THE SCALLOP FISHERY INCREASES	Neutral (as compared to FW 44 impacts) – Total groundfish catch does not change and if increase matches additional amount scallop fishery is expected to catch in 2010, less likelihood ACLs will be exceeded	Neutral (as compared to FW 44 impacts)	Neutral (compared to FW 44)	Neutral (compared to FW 44)	Mixed – An Increase reduces the likelihood that scallop fishery will be constrained, but reduces YTF available for groundfish fishery

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4.0 PROPOSED ACTION

4.1 Northeast Multispecies Fishery ACL Specifications for Fishing Years 2010-2012

4.1.1 Option Two – Fishery Specifications and ACLs for 2010-2012

Option two is the proposed option, whereas option one is the no action alternative (Section 5.1.1) Consistent with the process established by Amendment 16, and the ABC control rules adopted by that action, this action proposes the Acceptable Biological Catch (ABC) and Annual Catch Limits (ACLs) for FY 2010 – FY 2012. These ACLs will be the basis for determining whether Accountability Measures (AMs) are triggered as described in Amendment 16. As a result of the adoption of these ACLs, the incidental catch TACs that are applicable to the Category B (regular) DAS Program and certain Special Access Programs are also defined.

The ABCs and ACLs proposed for FY 2010- 2012 are shown in Table 2. This table includes the Overfishing Limits (OFLs) for each stock. The ABCs are those recommended by the Science and Statistical Committee (SSC) (see Appendix I). The PDT guidance for calculating ACLs is attached as Appendix II, while the ABC and ACL calculations are detailed in Appendix III. The incidental catch TACs for the same period are shown in Table 3.

The general approach for calculating these values begins with the ABCs set by the SSC (Appendix I). The ABC is distributed among the various components of the fishery as described in Amendment 16 and Appendices II and III. Each ABC is then adjusted for management uncertainty, where appropriate, using the adjustments approved by the Council, as shown in Appendix III.

These ACLs and incidental catch TACs are based on the composition of sector rosters as of September 1, 2009. The share of each stock that is available to sector and common pool vessels may differ from that shown should sector membership be revised. Once NMFS knows the final sector rosters, the ACLs applicable to each commercial component will be revised. This will also result in changes to the incidental catch TACs.

The FY 2011 – FY 2012 ACLs for GB cod, GB haddock, and GB yellowtail flounder may be modified as a result of future decisions of the Transboundary Management Guidance Committee (TMGC). Allocation of these stocks under the terms of the U.S./Canada Resource Sharing Understanding will affect the amount available for U.S. fishermen. For GB yellowtail flounder, the 2011 and 2012 values assume the U.S. and Canadian shares as would have resulted from the Understanding in (U.S.: 64 percent, Canada 36 percent) as in 2010. Because the allocations for EGB cod and haddock for FY 2011 and FY 2012 are unknown, and these management units are assessed each year separate from the remainder of the stock, the values shown in Table 2 are the maximum possible U.S. ABC/ACL and do not reflect any Canadian catch. A sense of the amount that may be allocated in 2011 and 2012 can be gained from the 2010 allocations: in 2010, the Canadian EGB cod TAC is 1,012 mt and the EGB haddock TAC is 17,612 mt.

Framework 42 adopted a mechanism for adjusting the TAC for the CAI Hook Gear Haddock SAP based on the relative difference between exploitable biomass in 2004 and the projected exploitable biomass for a given year. The formula is independent of the ACL specifications set in this section. The formula defined in FW 42 is:

TAC_{yr}=1,130 mt live weight X (Projected WGB Haddock Exploitable $Biomass_{yr}$/WGB Haddock Exploitable $Biomass_{2004}$)

The framework further defines that the western component of GB haddock will be estimated as 35 percent of the size of the total GB haddock stock unless an assessment that identifies and assesses this component. Using projections based on GARM III, the TACs for FY 2010 – FY 2012 are shown in Table 4. Note that the 2004 biomass value has been updated to reflect GARM III assessment results. For 2004, three-year (2002-2004) average partial recruitment and mean weights were used when calculating exploitable biomass as recommended by GARM II, while for FY 2010 - 2012 the five year average (2003-2007) was used in the projection as recommended by GARM III.

With respect to the TAC for the CAI Hook Gear Haddock SAP, the Proposed Action and the No Action alternative are the same. This action does not consider changing the formula adopted by FW 42, but just presents the results of applying that formula to projected stock size. It is included here to facilitate preparation of the EA for all specifications for this fishery.

Rationale: Amendment 16 described the process for establishing ACLs for the Multispecies FMP, a required element of all FMPs (see 16 U.S.C. 1853(a)(15): any fishery management plan shall "…establish a mechanism for specifying annual catch limits…at a level such that overfishing does not occur in the fishery…"). The amendment also adopted the ABC control rules recommended by the SSC, as recommended by the advisory guidelines for implementing the National Standards, 50 C.F.R. 600.310(f)(4). Using the process established by Amendment 16, this action sets the ABCs for FY 2010 - FY 2012 consistent with the ABC control rules that were adopted. Absent additional scientific information, it would not be consistent with the purpose of this action to consider ABCs that differ from the control rules adopted by that action. The ABCs have been set at a level such that a catch equal to the ABC is unlikely to result in overfishing (see section 6.1.1.1 for this analysis). This action also proposes the ACLs for FY 2010 – FY 2012. The development of these ACLs is detailed in the appendices. As noted in the M-S Act, the purpose of the ACLs is to ensure overfishing does not occur. In all cases the ACL is lower than the ABC, which means the risk of overfishing is even less at this catch than if the catch equals the ABC.

As noted in Amendment 16, it is expected that the ABCs and ACLs for FY 2012 – FY 2014 will be calculated and adopted before the FY 2012 ACL in this action is used.

The FY 2012 values here are specified in case there is a future delay in updating the ACLs.

The CAI Hook Gear Haddock SAP TACs are provided here for clarity; these are set based on regulations implementing FW 42. No changes were considered and the No Action alternative is identical.

Table 2 – Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2010 – FY 2012 (metric tons, live weight). Values are rounded to the nearest metric ton.

(1) YTF allocations for scallops are an other sub-component in FY 2010, but are expected to be sub-ACLs in FY 2011- 2012
(2) Grayed out values may be adjusted as a result of future recommendations of the TMGC. Values shown for GB haddock and cod in 2011 and 2012 are maximum possible and do not include any Canadian catch.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Cod[2]	2010	6,272	3,800	38	152	0	3,430			3,256	174	0	3,620
	2011	7,311	5,616	56	225	0	5,068			4,812	257	0	5,349
	2012	8,090	6,214	62	249	0	5,608			5,324	284	0	5,919
GOM Cod	2010	11,089	8,530	566	283	0		4,567	2,673	4,230	337	0	8,088
	2011	11,715	9,012	597	299	0		4,825	2,824	4,469	356	0	8,545
	2012	11,742	9,018	598	299	0		4,828	2,826	4,472	356	0	8,551
GB Haddock[2]	2010	80,007	44,903	449	1,796	0	40,440			39,313	1,127	84	42,768
	2011	59,948	46,784	468	1,871	0	42,134			40,959	1,174	87	44,560
	2012	51,150	39,846	398	1,594	0	35,885			34,885	1,000	74	37,952
GOM Haddock	2010	1,617	1,265	9	37	0		825	324	786	39	2	1,197
	2011	1,536	1,206	9	35	0		787	308	749	37	2	1,141
	2012	1,296	1,013	7	29	0		661	259	630	31	2	959
GB Yellowtail Flounder[2]	2010	5,148	1,200	0	60	110	999		0	934	65	0	1,169
	2011	6,083	1,081	0	54	197	799		0	747	52	0	1,050
	2012	7,094	1,226	0	61	308	822		0	769	53	0	1,191
SNE/MA Yellowtail Flounder	2010	1,553	493	5	20	111	332		0	241	91	0	468
	2011	2,174	687	7	27	80	527		0	383	144	0	641
	2012	3,166	1,003	10	40	126	760		0	552	208	0	936
CC/GOM Yellowtail Flounder	2010	1,124	863	9	35	0	779			727	52	0	822
	2011	1,355	1,041	10	42	0	940			876	63	0	992
	2012	1,508	1,159	12	46	0	1,046			976	70	0	1,104
Plaice	2010	4,110	3,156	32	126	0	2,848			2,665	184	0	3,006
	2011	4,483	3,444	34	138	0	3,108			2,908	200	0	3,280
	2012	4,727	3,632	36	145	0	3,278			3,067	211	0	3,459

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Prelim-inary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
Witch Flounder	2010	1,239	944	9	38	0	852			810	42	0	899
	2011	1,792	1,369	14	55	0	1,236			1,174	61	0	1,304
	2012	2,141	1,639	16	66	0	1,479			1,406	73	0	1,561
GB Winter Flounder	2010	2,660	2,052	0	103	0	1,852			1,797	55	0	1,955
	2011	2,886	2,224	0	111	0	2,007			1,948	60	0	2,118
	2012	3,297	2,543	0	127	0	2,295			2,227	68	0	2,422
GOM Winter Flounder	2010	441	238	60	12	0	158			132	26	0	230
	2011	570	238	60	12	0	158			132	26	0	230
	2012	685	238	60	12	0	158			132	26	0	230
SNE/MA Winter Flounder	2010	1,568	644	53	32	0	520			0	520	0	605
	2011	2,117	897	72	45	0	726			0	726	0	842
	2012	2,830	1,198	96	60	0	969			0	969	0	1,125
Redfish	2010	9,899	7,586	76	303	0	6,846			6,613	234	0	7,226
	2011	10,903	8,356	84	334	0	7,541			7,284	257	0	7,959
	2012	12,036	9,224	92	369	0	8,325			8,041	284	0	8,786
White Hake	2010	4,130	2,832	28	113	0	2,556			2,435	121	0	2,697
	2011	4,805	3,295	33	132	0	2,974			2,833	141	0	3,138
	2012	5,306	3,638	36	146	0	3,283			3,128	156	0	3,465
Pollock	2010	5,085	3,293	200	200	0	2,748			2,630	118	0	3,148
	2011	5,085	3,293	200	200	0	2,748			2,630	118	0	3,148
	2012	5,085	3,293	200	200	0	2,748			2,630	118	0	3,148
N. Window-pane Flounder	2010	225	169	2	49	0	110			0	110	0	161
	2011	225	169	2	49	0	110			0	110	0	161
	2012	225	169	2	49	0	110			0	110	0	161

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
S. Window-pane Flounder	2010	317	237	2	69	0	154			0	154	0	225
	2011	317	237	2	69	0	154			0	154	0	225
	2012	317	237	2	69	0	154			0	154	0	225
Ocean Pout	2010	361	271	3	11	0	239			0	239	0	253
	2011	361	271	3	11	0	239			0	239	0	253
	2012	361	271	3	11	0	239			0	239	0	253
Atlantic Halibut	2010	119	71	36	4	0	30			0	30	0	69
	2011	130	78	39	4	0	33			0	33	0	76
	2012	143	85	43	4	0	36			0	36	0	83
Atlantic Wolffish	2010	92	83	1	3	0	73			0	73	0	77
	2011	92	83	1	3	0	73			0	73	0	77
	2012	92	83	1	3	0	73			0	73	0	77

Table 3 – Preliminary incidental catch TACs for Special Management Programs (metric tons, live weight). These values may change as a result of changes in sector membership.

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

Table 4 – Proposed CAI Hook Gear Haddock SAP TACs, FY 2010- 2012

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

4.1.1.1 Yellowtail Flounder Allocations for the Scallop Fishery

Amendment 16 adopts ACLs for groundfish stocks. Some of these ACLs are divided into either sub-ACLs that are subject to accountability measures (AMs), or other sub-components that are not subject to AMs. The amendment proposes that a portion of yellowtail flounder will be allocated to the scallop fishery. In FY 2010, the allocation is considered a sub-component, while in FY 2011 and beyond it will be considered a sub-ACL subject to AMs that will be adopted in Scallop Amendment 15. The values for FY 2011 and FY 2012 may be revised in the future based on updated scallop and yellowtail flounder stock information, TMGC recommendations, and on future scallop fishery access area measures.

An estimate of the yellowtail flounder that will be caught by the scallop fishery in FY 2010 – FY 2012 if it harvests its projected yield was developed for four scallop management scenarios. In FY 2010, the scallop fishery will be assumed to catch 100 percent of the GB and SNE/MA yellowtail flounder projected to be caught if the scallop yield is harvested. In FY 2011 and FY 2012, the GB and SNE/MA yellowtail founder that will be allocated to the fishery in those years is 90 percent of this amount. For CC/GOM yellowtail flounder, scallop fishery incidental catches are low enough that they will be considered part of the “other sub-component”. These catches will be monitored but a specific allocation will not be made in this action. An allocation may be made in the future.

Allocations are adjusted for management uncertainty when the allocation becomes a sub-ACL (in FY 2011 and beyond). As explained in Appendix III, for GB and CC/GOM yellowtail flounder (if/when specified) the sub-ACL will be set at 97 percent of the allocation, while for SNE/MA yellowtail flounder it will be set at 93 percent of the allocation.

The resulting values are shown in Table 5 for the scallop management scenario proposed in Scallop Framework Adjustment 21.

See section 2.9 for a discussion of possible changes to this allocation.

<u>Rationale</u>: This alternative recognizes the importance of yellowtail flounder to the prosecution of the scallop fishery and allocates most of the yellowtail flounder that the fishery is expected to catch if it harvests the available scallop yield. It also creates an incentive for scallop fishermen to reduce bycatch of yellowtail flounder in order to maximize scallop yield. With respect to Cape Cod/Gulf of Maine yellowtail flounder, no allocation is made since the incidental catch is a low percentage of the available catch and can be accommodated by the “other sub-components” category. An allocation of this stock may be made in the future.

Table 5 – Proposed allocation of yellowtail flounder to the scallop fishery. Values are metric tons, live weight, rounded to the nearest metric ton. (1) This value is considered an "other sub-component) in FY 2010 and is not a sub-ACL.

No Closure F = 0.20	*Total Expected to be Caught, YTF Stock Area*			*Scallop Fishery ABC*			*Sub-ACL*		
Year	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*
2010	30	110	111		110	111		110 (1)	111 (1)
2011	26	226	96		203	86		197	80
2012	32	353	151		318	136		308	126

4.1.1.2 Sub-option Two – U.S./Canada Resource Sharing Understanding TACs

This alternative specifies hard TACs for the U.S./Canada Management Area for FY 2010 (May 1, 2010 – April 30, 2011) as indicated in Table 6 below. These TACs would be in effect for the remainder of the fishing year, unless NMFS determines that the catch of GB cod, haddock, or yellowtail flounder from the U.S./Canada Management Area in FY 2009 exceeded the pertinent 2009 TAC. The Understanding and the regulations require that if a TAC is exceeded in a particular fishing year, then the TAC for the subsequent fishing year is reduced by the amount of the overage (TAC adjustment). In order to minimize any disruption of the fishing industry, NMFS would attempt to make any necessary TAC adjustments in the first quarter of the fishing year.

Table 6 – Proposed FY 2010 U.S./Canada TACs (mt) and Percentage Shares

	Eastern GB Cod	**Eastern GB Haddock**	**GB Yellowtail Flounder**
Total Shared TAC	1,350	29,600	1,500
U.S. TAC	338 (25%)	11,988 (40.5%)	1,200
Canada TAC	1,012 (75%)	17,612 (59.5%)	pending

These proposed TACs are based on the TRAC's guidance to the TMGC (TRAC Status Report 2009/01, 2009/02, and 2009/03; June 2009), and the TMGC's recommendations (TMGC Meeting of September 15, 16, 2009). The above GB yellowtail flounder TAC has not been adjusted downward to reflect management uncertainty or any allocation to the scallop fishery.

With respect to GB yellowtail flounder, the proposed U.S. TAC is based upon the recommendation of the Science and Statistical Committee recommendation for the ABC. The SSC made its recommendation at its August, 2009 meeting, based upon the 2009 TRAC Status Report, and the proposal that the U.S. delegates presented to the TMGC was consistent with the advice of the SSC (1,500 mt). In contrast, the Canadian delegation stated that they proposed 2,700 mt in order to be within the range of TRAC advice and to be consistent with the TMGC strategy, as well as to support the Understanding. It was noted that this level was close to a rebuilding fishing mortality of 0.107. The U.S. delegation explained to the Canadians that they proposed 1,500 mt because they are constrained to this level due the U.S. law and the Fishery Management Plan (FMP) rebuilding requirement. They noted that this shared catch would result in a 19% increase in amount of yellowtail for Canada in 2010.

The Canadian point of view was that since biomass is relatively high and F is low, there is not justification to be reducing the catch further. Even though recruitment has been inconsistent, there are positive indicators of stock performance. In contrast, the U.S. point of view was that the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the FMP require the stock to rebuild by 2014 and require use of the most recent scientific information, and that the laws provide no flexibility at this time (unless the MSA is modified).

The Canadian delegation suggested that an avenue to obtain flexibility may be either to refrain from revising the calculation of $F_{rebuild}$ annually, or to modify the FMP to adopt a lower probability of rebuilding than the currently adopted 75% probability. The U.S. delegates concluded that these ideas, although logical, could not be pursued at this time, given the restrictions of the MSA, the FMP, and the Council process.

Because the TMGC could not come to a consensus on an appropriate shared catch for GB yellowtail, they acknowledged this impasse and agreed to disagree. The Council voted on September 23, 2009 to adopt the recommendation of the TMGC for Eastern GB cod and Eastern GB haddock. The Council adopted a U.S. GB yellowtail flounder TAC of 1,200 mt, which was determined based on the SSC recommendation of 1,500 mt for a shared TAC, minus 300 mt for an assumed Canadian catch. 300 mt is slightly greater than the average Canadian catch of GB yellowtail flounder for 2008, 2007, and 2006, according to Canadian information presented to the TMGC (151, 132, and 590 mt, respectively).

The size of the Proposed 2010 TACs relative to the 2009 TACs is shown in Table 7.

Table 7 – Comparison of Proposed FY 2010 U.S./Canada TACs with FY 2009 TACs

Stock	FY 2009 (mt)	FY 2010 (mt)	Percent Change
Eastern GB cod	527	338	- 36 %
Eastern GB haddock	11,100	11,988	+ 8 %
GB yellowtail	1,617	* 1,200	- 32 %

* does not reflect management uncertainty adjustment or allocation to scallop fishery

The changes in the TACs reflect both changes to the percentage shares for the U.S., pursuant to the U.S./Canada Understanding (increase for haddock and decreases for cod and yellowtail), as well as stock status, and the TMGC recommendations. The weighting formula used to determine the percentage shares was 90/10 (resource distribution/historic utilization). More information on the calculation of the percentage shares may be accessed through the TMGC web site at the following address: http://www.mar.dfo-mpo.gc.ca/science/tmgc/background/share.pdf.

4.2 Commercial Fishery Effort Control Modification

4.2.1 Option Two – Modification of Trip Limits

Option two is the proposed option, whereas option one is the no action alternative (Section 5.2.1) The trip limit for GOM cod at the beginning of FY 2010 will be 800 lbs. per DAS and 4,000 lbs. per trip. The initial trip limit for GOM pollock will be 1,000 lbs. per DAS, up to 10,000 lbs. per trip. For cod, Handgear A permits will have a trip limit of 300 lbs., while Handgear B permits will be limited to 75 lbs. per trip. Also, since Option 4 of this section is also adopted, these numbers will apply at the start of the fishing year and may be changed by the RA during the year. For limited access scallop fishery vessels, there will be no trip limit for yellowtail flounder and limited access scallop vessels will be required to land all legal-sized yellowtail flounder that is caught. Groundfish vessels will still have yellowtail flounder trip limits as implemented in Amendment 16.

Rationale: The sub-ACL for the common pool is projected to be low in FY 2010 based upon current sector membership. If it is likely that the ACL may be rapidly exceeded, a derby fishery is likely to occur. Trip limits will be set somewhat conservatively at the start of the season in order to account for uncertainty over sector membership and common pool fishing practices. The trip limits for these stocks are set at the same level as in FY 2009 to ease the transition to the new management measures and so that discards are not increased from existing levels. This action does not change the automatic adjustment to

Handgear A and B trip limits that was adopted by Amendment 13; these trip limits change in proportion to changes in trip limits for DAS vessels.

4.2.2 Option Four – Effort Control Measure Adjustments

The proposed alternative is alternative 4. Alternative 3 is one of the other alternatives not selected (Section 5.2.2 Modification to DAS Counting). The Regional Administrator has the authority and responsibility to monitor the catch of multispecies stocks in relationship to the ACLs and is authorized to modify certain effort control measures for common pool vessels as appropriate consistent with procedures established by the Administrative Procedures Act (APA). Effort control measures that may be modified in this manner include possession limits and DAS counting rates. Measures can be adjusted at any time during the fishing year to facilitate harvesting ACLs or to reduce the likelihood that ACLs of allocated multispecies stocks in all areas will be exceeded.

If time permits, the Council may provide advice to the Regional Administrator on the administration of this provision.

Rationale: Under existing regulations, in-season adjustments generally cannot be made to the measures for the common pool. There are limited exceptions, such as measures that can be adjusted to implement the U.S./Canada Resource Sharing Understanding, and beginning in FY 2012 if an ACL is projected to be reached under the hard TAC accountability measure. By this action, the RA is provided authority and guidance to adjust effort control measures. This action allows the Regional Administrator to adjust measures as necessary, and provides more flexibility to change measures at any time if necessary to harvest the ACL or to avoid exceeding the ACL.

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5.0 ALTERNATIVES TO THE PROPOSED ACTION

5.1 Northeast Multispecies Fishery ACL Specifications for Fishing Years 2010-2012

5.1.1 Option One – No Action

Under this alternative, no action would be taken by the Council to implement specifications for FY 2010. It is important to note that failure to take action would violate several provisions of the Magnuson Stevens Act, and hence this alternative is not allowable by law.

The M-S Act requires that an ACL be imposed on stocks that are subject to overfishing by FY 2010, and that an ACL be adopted for remaining stocks in 2011. Because of that requirement, it is reasonable to assume that NMFS would act to impose ACLs as quickly as possible in the absence of Council action although it is difficult to predict what those ACLs would be. At a minimum NMFS would be expected to adopt ACLs for all multispecies stocks for FY 2010 except halibut, pout, plaice, redfish, GOM haddock, and GB haddock since those stocks are not subject to overfishing. The MSA requires that ACLs be set at a level equal to or lesser than the ABC recommended by the SSC. For the purposes of the No Action alternative, the best assumption is that the ABCs (Table 8) will be used as ACLs for overfished stocks.

Under the No Action alternative, NMFS would be expected to set the CAI Hook Gear Haddock SAP TACs shown in Table 4. The process for establishing these TACs was adopted in FW 42 and was not changed by Amendment 16.

Under the No Action alternative, the ACL will be distributed between sectors, the common pool, and other subcomponents of the fishery as described in Amendment 16. However, there will be no separate allocation of yellowtail flounder to the scallop fishery. Any yellowtail caught by the scallop fishery would fall under the “other subcomponents” category of the ACL.

If no action is taken on specifications, the recommendations of the TMGC will also not be implemented and there will be no TAC for GB cod, haddock, or yellowtail flounder in the U.S./Canada area for FY 2010. Vessels would still be constrained by the other regulations of the FMP, including days-at-sea (DAS), sector regulations, and closed areas.

Table 8 – ABCs and OFLs for multispecies stocks that are subject to overfishing

Stock	Year	OFL	U.S. ABC
GB Cod	2010	6,272	3,800
	2011	7,311	5,616
	2012	8,090	6,214
GOM Cod	2010	11,089	8,530
	2011	11,715	9,012
	2012	11,742	9,018
GB Yellowtail Flounder	2010	5,148	1,200
	2011	6,083	1,081
	2012	7,094	1,226
SNE/MA Yellowtail Flounder	2010	1,553	493
	2011	2,174	687
	2012	3,166	1,003
CC/GOM Yellowtail Flounder	2010	1,124	863
	2011	4,483	1,041
	2012	4,727	1,159
Witch Flounder	2010	1,239	944
	2011	1,792	1,369
	2012	2,141	1,639
GB Winter Flounder	2010	2,660	2,052
	2011	2,886	2,224
	2012	3,297	2,543
GOM Winter Flounder	2010	441	238
	2011	570	238
	2012	685	238
SNE/MA Winter Flounder	2010	1,568	644
	2011	2,117	897
	2012	2,830	1,198
White Hake	2010	4,130	2,832
	2011	4,805	3,295
	2012	5,306	3,638
Pollock	2010	5,085	3,293
	2011	5,085	3,293
	2012	5,085	3,293
N. Window-pane Flounder	2010	225	169
	2011	225	169
	2012	225	169
S. Window-pane Flounder	2010	317	237
	2011	317	237
	2012	317	237
Atlantic Wolffish	2010	92	83
	2011	92	83
	2012	92	83

5.1.1.1 Sub-option One –Yellowtail Flounder Allocations for the Scallop Fishery – Groundfish Committee Recommendation

Amendment 16 adopts ACLs for groundfish stocks. Some of these ACLs are divided into either sub-ACLs that are subject to accountability measures (AMs), or other sub-components that are not subject to AMs. The amendment proposes that a portion of yellowtail flounder will be allocated to the scallop fishery. In FY 2010, the allocation is considered a sub-component, while in FY 2011 and beyond it will be considered a sub-ACL subject to AMs that will be adopted in a scallop amendment.

An estimate of the yellowtail flounder that will be caught by the scallop fishery in FY 2010 – FY 2012 if it harvests its projected yield was developed for four scallop management scenarios. The GB and SNE/MA yellowtail founder that will be allocated to the fishery in those years is 90 percent of the amount for the scallop management alternative selected for Scallop FW 21. For CC/GOM yellowtail flounder, scallop fishery incidental catches are low enough that they will be considered part of the "other sub-component". These catches will be monitored but a specific allocation will not be made in this action. An allocation may be made in the future.

This value will be adjusted for management uncertainty when the allocation becomes a sub-ACL (in FY 2011 and beyond). As explained in Appendix III, for GB and CC/GOM yellowtail flounder the sub-ACL will be set at 97 percent of the allocation, while for SNE/MA yellowtail flounder it will be set at 93 percent of the allocation.

The resulting values are shown in Table 9 for the four scallop management scenarios that were under consideration during development of this action. Scallop FW 21 implements the first listed management scenario (no new closure and F=0.20).

<u>Rationale</u>: This alternative recognizes the importance of yellowtail flounder to the prosecution of the scallop fishery and allocates most of the yellowtail flounder that the fishery is expected to catch if it harvests the available scallop yield. It also creates an incentive for scallop fishermen to reduce bycatch of yellowtail flounder in order to maximize scallop yield. With respect to Cape Cod/Gulf of Maine yellowtail flounder, no allocation is made since the incidental catch is a low percentage of the available catch and can be accommodated by the "other sub-components" category. An allocation may be made in the future.

Table 9 – Sub-Option 1A – Groundfish Committee recommended allocation of yellowtail flounder to the scallop fishery. Values are metric tons, rounded to the nearest metric ton.

No Closure F = 0.20	*Total Expected to be Caught, YTF Stock Area*			*90 percent of Total*			*Sub-ACL*		
Year	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*
2010	30	110	111		99	100		96	93
2011	26	226	96		203	86		197	80
2012	32	353	151		318	136		308	126
No Closure - F = 0.24									
2010	39	146	135		131	122		127	113
2011	26	230	98		207	88		201	82
2012	32	352	151		317	136		307	126
Closure F = 0.18									
2010	17	182	179		164	161		159	150
2011	13	256	130		230	117		223	109
2012	10	320	151		288	136		279	126
Closure F = 0.20									
2010	20	215	202		194	182		188	169
2011	13	263	134		237	121		230	112
2012	10	317	153		285	138		277	128

5.2 Commercial Fishery Effort Control Modification

5.2.1 Option One – No Action

Under this No Action option, the effort controls adopted by Amendment 16 would continue unchanged. The effort control alternative selected in A16 eliminated previously-existing differential DAS counting areas, reduced Category A DAS by 50 percent from the FW 42 allocations, and counted all DAS in 24-hour increments (i.e. 6 hours is counted as one DAS, 25 hours is counted as two DAS, etc.). Other measures that were in place prior to the implementation of Amendment 16 remained, including seasonal and rolling closures and gear requirements.

<u>Trip Limits:</u>

The trip limits in Table 10 were implemented for fishing on a Category A DAS, while all other trip limits while fishing on a Category A DAS were eliminated. For GB and GOM cod, Handgear A permits are allowed a 750-lb. per trip landing limit, while Handgear B permits are allowed 200 lbs. per trip.

Table 10 – No Action trip limits for common pool vessels

<table>
<tr><th>Stock</th><th>Amendment 16</th></tr>
<tr><td>GOM Cod</td><td rowspan="2">2,000 lbs./DAS; maximum 12,000 lbs/trip in GOM, 20,000 lbs/trip in GB; with the exception of the Eastern U.S./Canada area, where the Regional Administrator will specify the appropriate trip limit at the beginning of the fishing year (the default trip limit for this area remains 500 lbs./DAS, up to a maximum of 5,000 lbs./trip).</td></tr>
<tr><td>GB Cod</td></tr>
<tr><td>CCGOM Yellowtail Flounder</td><td>250 lbs./ DAS up to a maximum of 1,500 lbs./trip</td></tr>
<tr><td>SNE/MA Yellowtail Flounder</td><td>250 lbs./ DAS up to a maximum of 1,500 lbs./trip</td></tr>
<tr><td>SNE/MA Winter Flounder</td><td>0</td></tr>
<tr><td>Windowpane Flounder</td><td>0</td></tr>
<tr><td>Atlantic Halibut</td><td>One fish/trip</td></tr>
<tr><td>Ocean Pout</td><td>0</td></tr>
<tr><td>Atlantic Wolffish</td><td>0</td></tr>
</table>

<u>Restricted Gear Areas</u>:

Two restricted gear areas were established in Amendment 16 (Figure 1). Vessels fishing under a groundfish DAS are required to comply with the gear requirements for these areas.

Administration: Vessel operators must comply with the following administrative requirements to fish in these areas:

- As specified by the Regional Administrator, vessel operators must either request a Letter of Authorization (LOA) from NMFS or must make a specific VMS declaration to fish in the areas. The minimum participation period if an LOA is required is seven days.

- A vessel can fish inside and outside the area on the same trip, but is subject to the most restrictive measures (gear, trip limits, etc.) for the entire trip.
- Existing gear performance standards apply to gear used in these areas. Gillnets with large mesh that are allowed in the area are allowed to retain monkfish subject to monkfish possession limits and not the gear performance standards.
- Other gear is not allowed on board when operating in these areas.
- Additional gear (such as the five-point trawl, raised footrope trawl, or tie-down sink gillnets with mesh less than ten inches) may be considered for use in this area if approved by the Regional Administrator consistent with the regulations for approving additional gear in special management programs.

Areas: The areas are defined as:

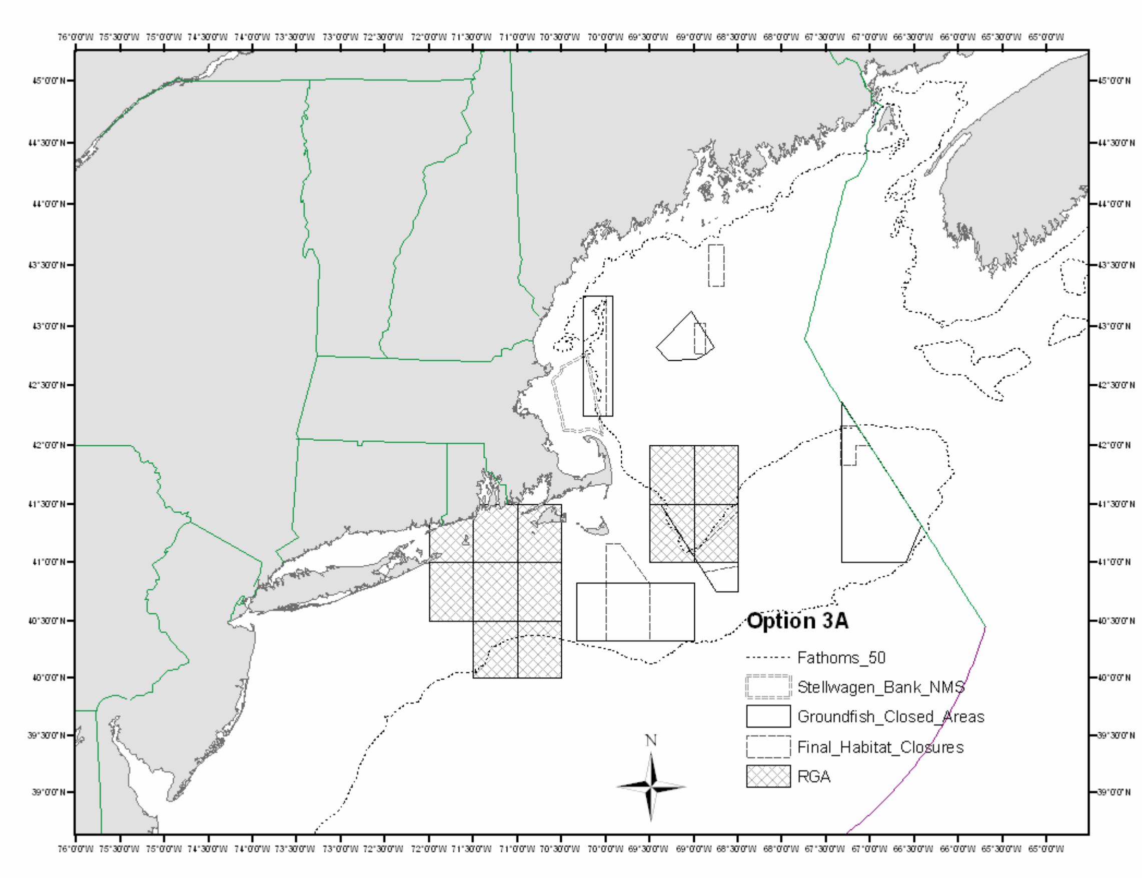
Western GB Multispecies RGA:

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

Southern New England Multispecies RGA:

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

Figure 1 –Restricted gear areas adopted in Amendment 16



<u>Gear restrictions</u> include the following authorized gears:

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

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

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

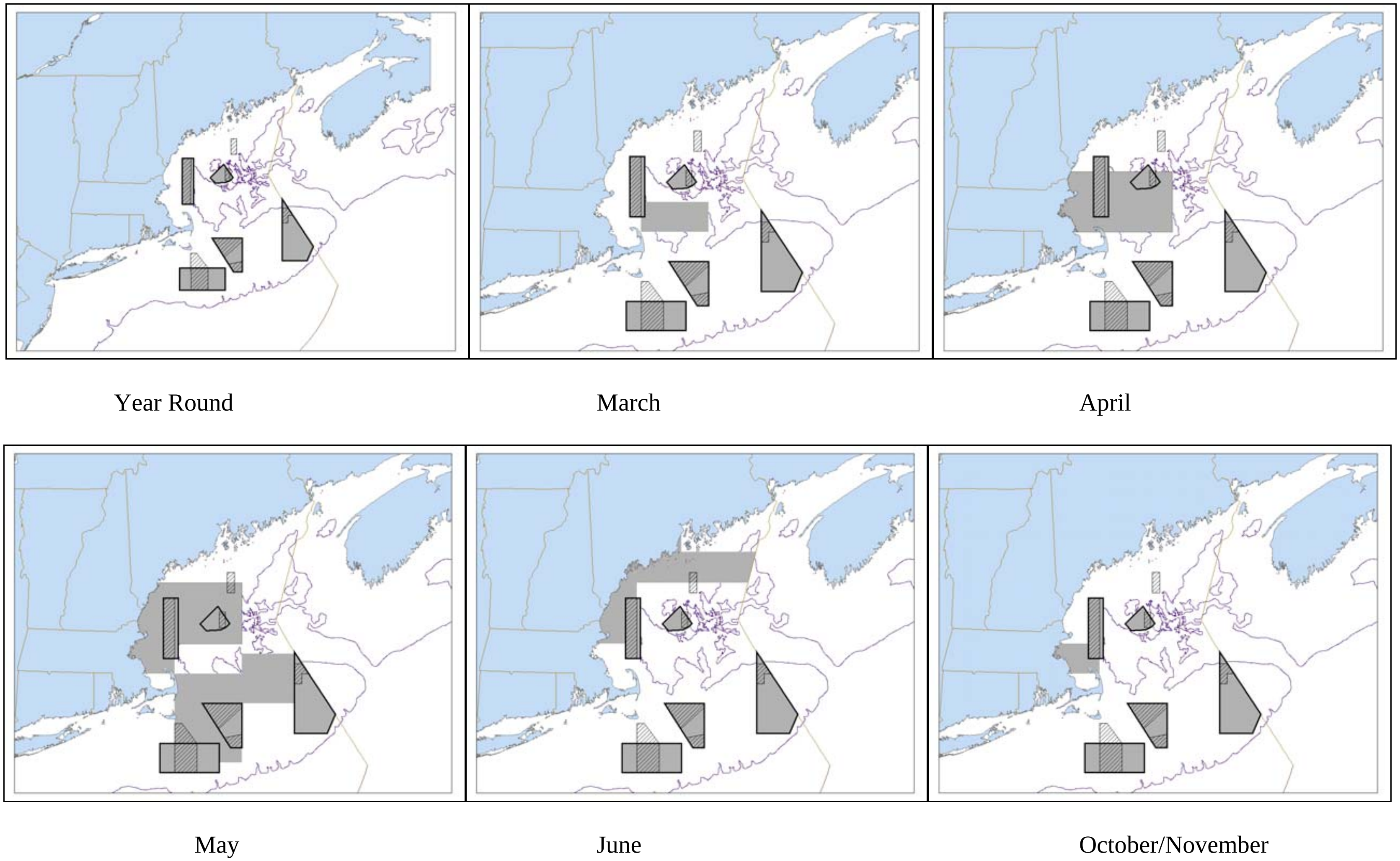
Longline/tub trawls

Handgear

Table 11 – Gear restrictions under No Action alternative

	GOM	GB	SNE	Mid-Atl
MINIMUM MESH SIZE RESTRICTIONS FOR GILLNET GEAR				
NE Multispecies Day Gillnet Category*	Roundfish nets 6.5" (16.5 cm) mesh; 50-net allowance	All nets 6.5" (16.5 cm) mesh; 50-net allowance	All nets 6.5" (16.5 cm) mesh; 75-net allowance	Roundfish nets 6.5" (16.5 cm) mesh; 75-net allowance
	Flatfish nets 6.5" (16.5 cm) mesh; 100-net allowance			Flatfish nets 6.5" (16.5 cm) mesh; 75-net allowance
NE Multispecies Trip Gillnet Category*	All nets 6.5" (16.5 cm) mesh; 150-net allowance	All nets 6.5" (16.5 cm) mesh; 150-net allowance	All nets 6.5" (16.5 cm) mesh; 75-net allowance	All gillnet gear 6.5" (16.5 cm) mesh; 75-net allowance
Monkfish Vessels**	10" (25.4 cm) mesh/150-net allowance			
MINIMUM MESH SIZE RESTRICTIONS FOR TRAWL GEAR				
Codend only mesh size*	6.5" (16.5 cm) diamond or square		7.0" (17.8 cm) diamond or 6.5" (16.5 cm) square	6.5" (16.5 cm) diamond or square
Large Mesh Category - entire net	8.5" (21.59 cm) diamond or square			7.5" (19.0 cm) diamond or 8.0" (20.3 cm) square
MAXIUM NUMBER OF HOOKS AND SIZE RESTRICTIONS FOR HOOK-GEAR*				
Limited access multispecies vessels	2,000 hooks	3,600 hooks	2,000 hooks	4,500 hooks (Hook-gear vessels only)
	No less than 6" (15.2 cm) spacing allowed between the fairlead rollers			
	12/0 circle hooks required for longline gear			N/A

Figure 2 – No action alternative closed areas used as mortality controls



Closed Areas:

Amendment 16 did not authorize additional closed areas. However, closures in place prior to its adoption remain in effect (Figure 2).

In-Season Adjustments to Mortality Control Measures:

The Regional Administrator has the authority to impose trip limits as necessary under the provisions implementing the U.S./Canada Resource Sharing Understanding. Under those regulations, the Regional Administrator specifies the trip limit for GB yellowtail flounder. In all cases, only one landing limit can be landed in any twenty-four hour period. If a vessel fishes in more than one area, the most restrictive trip limit for a species applies for the entire trip.

The RA does not have the authority to modify effort control measures in other areas absent Council action. The only exception lies in the administration of accountability measures including post-season differential DAS adjustments for FY 2010 and 2011 and the hard TAC AM in FY 2012.

5.2.2 Option Three – Modification to Days At Sea Counting

The inshore Gulf of Maine area depicted in Figure 3 will be subject to differential DAS counting at a rate of 2:1 at the outset of FY 2010. The area to be included consists of Blocks 114-116, 123-125, 132, 133, and 138-140. The area described for the inshore GOM is the same as is adopted for the Amendment 16 differential DAS accountability measure, as shown in Figure 3. If Option 4 of this section is also adopted, these counting rates will apply at the start of the fishing year and may be changed by the RA during the year.

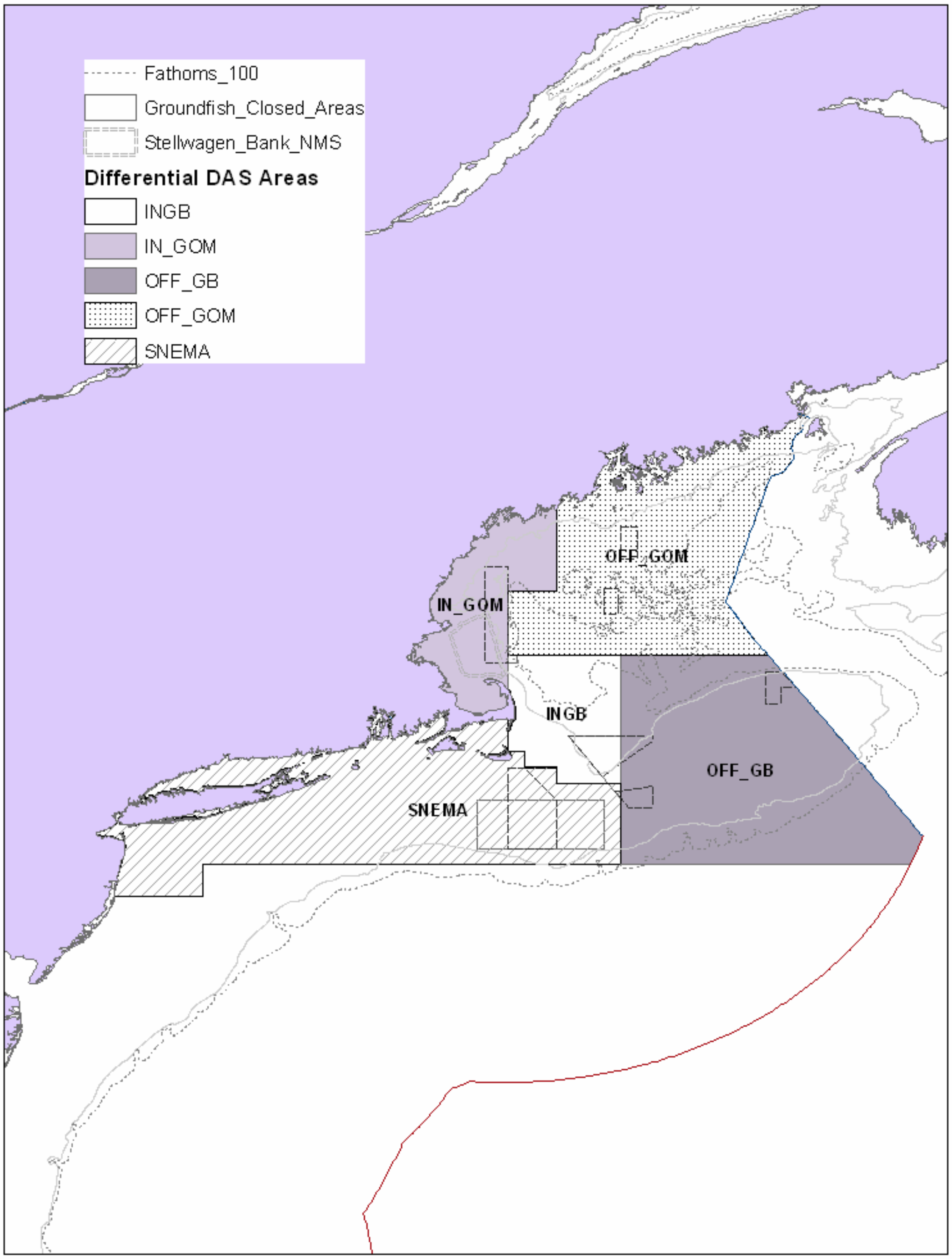
Inshore GOM Differential DAS Area

Point	N. Latitude	W. Longitude
INGOM1	([1])	69° 30’
INGOM2	43° 00’	69° 30’
INGOM3	43° 00’	70° 00’
INGOM4	([2])	70° 00’

([1]) Intersection with ME shoreline
(2) North-facing shoreline of Cape Cod, MA

Rationale: The use of a differential DAS adjustment as a mortality reduction measure is based on the concept that if stock size is known a change in catch results in a proportional change in exploitation. The area proposed coincides with a broad reporting area, simplifying administration and matching the differential DAS area with stock boundaries. Concern over rapidly exceeding the common pool sub-ACL for GOM cod and pollock stocks would lead to the differential DAS area being set somewhat conservatively at the start of the season in order to account for uncertainty over sector membership and common pool fishing practices.

Figure 3 – Proposed areas for differential DAS AM



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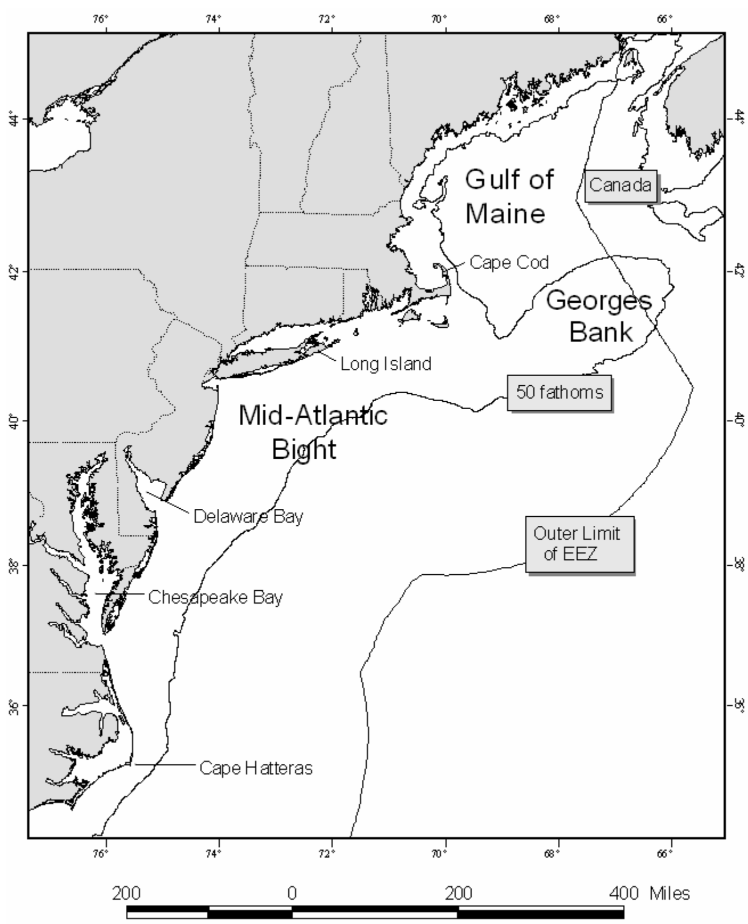
6.0 AFFECTED ENVIRONMENT

The Valued Ecosystem Components (VECs) affected by the Proposed Action 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 4) has been described as including the area from the Gulf of Maine south to Cape Hatteras, North Carolina, extending from the coast seaward to the edge of the continental shelf, including offshore to the Gulf Stream (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 2,000 meters (m). Four distinct sub-regions comprise the NOAA Fisheries Northeast Region: the Gulf of Maine, Georges Bank, the southern New England/Mid-Atlantic region, and the continental slope. Since the groundfish fleet will primarily be fishing in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic areas, the description of the physical and biological environment is focused on these sub-regions. Information on the affected environment was extracted from Stevenson et al. (2004).

Figure 4 – Northeast U.S. Shelf Ecosystem

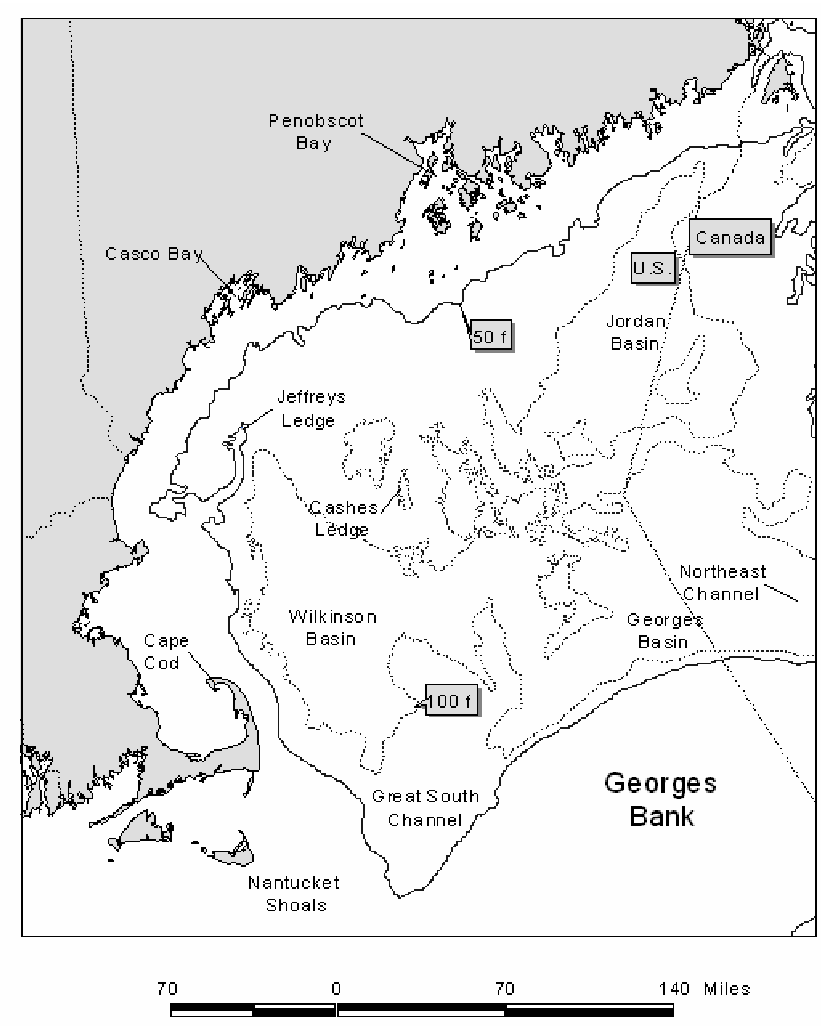


6.1.1 Affected Physical Environment

6.1.1.1 Gulf of Maine

The Gulf of Maine is an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Figure 5). The Gulf of Maine is a boreal environment and is characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 9 m below the surface.

Figure 5 – Gulf of Maine



The Gulf of Maine is an enclosed coastal sea that was glacially derived and is characterized by a system of deep basins, moraines, and rocky protrusions (Stevenson et al. 2004). The Gulf of Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast (Stevenson et al. 2004). Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains.

In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[1] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a depth of about 60 m. Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 20 to 40 m, except off eastern Maine where a gravel-covered plain exists to depths of at least 100 m. Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.1.1.2 Georges Bank

Georges Bank is a shallow (3 to 150 m depth), elongate (161 kilometer [km] wide by 322 km long) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Figure 4.1-1). It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank and has steep submarine canyons on its eastern and southeastern edges. It is characterized by highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents reduces the amount of sand and cause an overall coarsening of the bottom sediments (Valentine and Lough 1991).

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

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

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

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

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

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

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

As stated in Section 4.1.1.1, common demersal fish species in Georges Bank are offshore hake, blackbelly rosefish, Gulf stream flounder, silver hake, red hake, goosefish (monkfish), Atlantic cod, haddock, pollock, yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin, white hake, American plaice, witch flounder, and thorny skate.

6.1.1.3 Southern New England/Mid-Atlantic Bight

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream (Figure 4.1-1). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England and generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 to 200 m water depth) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson et al. 2004). Like the rest of the continental shelf, the topography of the Mid-Atlantic Bight was shaped largely by sea level fluctuations during past ice ages. Since that time, currents and waves have modified this basic structure.

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

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

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

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

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

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

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

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

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

Water of the inner shelf: windowpane flounder;

Water of the outer shelf: fourspot flounder; and

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

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

6.1.2 Habitat

Habitats provide living things with the basic life requirements of nourishment and shelter, ultimately providing for both individual and population growth. The fishery resources of a region are influenced by the quantity and quality of available habitat. Depth, temperature, substrate, circulation, salinity, light, dissolved oxygen, and nutrient supply are important parameters of a given habitat which, in turn, determine the type and level of resource population that the habitat supports. Table 12 briefly summarizes the habitat requirements for each of the 12 groundfish species managed by the Northeast Multispecies (large-mesh) FMP, some of which consist of multiple stocks within the Northeast Multispecies FMP. Information for this table was extracted from the original FMP and profiles available from NMFS (Clark 1998). Essential fish habitat information for egg, juvenile and adult life stages for these species was compiled from Stevenson et al. 2004 (Table 12). 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 12.

Table 12 - Summary of geographic distribution, food sources, essential fish habitat features, and commercial gear used to catch each species in the Northeast Multispecies Fishery Management Unit

Species	Geographic Region of the Northwest Atlantic	Food Source	Essential Fish Habitat		Commercial Fishing Gear Used
			Water Depth	Substrate	
Atlantic cod	Gulf of Maine, Georges Bank and southward	Omnivorous (invertebrates and fish)	(J): 25-75 m (82-245 ft)	(J): Cobble or gravel bottom substrates	Otter trawl, longlines, gillnets
			(A): 10-150 m (33-492 ft)	(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): 35-100 m (115– 28 ft)	(J): Pebble and gravel bottom substrates	Otter trawl, longlines, gillnets
			(A): 40-150 m (131-492 ft)	(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): 25-400 m (82-1,312 ft)	(J): Bottom habitats with a substrate of silt, mud, or hard bottom	Otter trawl
			(A): 50-350 m (164–1,148 ft)	(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): 0-250 m (0-820 ft)	(J): Bottom habitats with aquatic vegetation or substrate of sand, mud, or rocks	Otter trawl, gillnets
			(A): 15-365 m (49-1,198 ft)	(A): Hard bottom habitats including artificial reefs	

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

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

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

6.1.3 Essential Fish Habitat (EFH)

EFH is defined by the Sustainable Fisheries Act of 1996 as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The environment that could potentially be affected by the Proposed Action has been identified as EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; Atlantic sea scallop; monkfish; deep-sea red crab; northeast skate complex; Atlantic herring; summer flounder, scup, and black sea bass; tilefish; squid, Atlantic mackerel, and butterfish; Atlantic surfclam and ocean quahog FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and Federal waters throughout the Northeast U.S. Shelf Ecosystem. EFH descriptions of the general substrate or bottom types for all the benthic life stages of the species managed under these FMPs are summarized in Table 12. Full descriptions and maps of EFH for each species and life stage (except Atlantic wolffish) are available on the NMFS Northeast Region website at http://www.nero.noaa.gov/hcd/index2a.htm. In general, EFH for species and life stages that rely on the seafloor for shelter (e.g., from predators), reproduction, or food is vulnerable to disturbance by bottom tending gear. The most vulnerable habitat is more likely to be hard or rough bottom with attached epifauna.

6.1.4 Gear Types and Interaction with Habitat

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

6.1.4.1 Gear Types

The characteristics of typical gear types used by the multispecies fishery are summarized in Table 13.

Table 13 - Descriptions of the Fixed Gear Types Used by the Multispecies Fishery

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

6.1.4.2 Trawl Gear

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

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

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

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

Bottom otter trawls that are used on "hard" bottom (i.e., gravel or rocky bottom), or mud or sand bottom with occasional boulders, are rigged with rockhopper gear. The purpose of the "ground gear" in this case is to get the sweep over irregularities in the bottom without damaging the net. The purpose of the sweep in trawls rigged for fishing on smooth bottoms is to herd fish into the path of the net (Mirarchi 1998). The raised-footrope trawl was designed to provide vessels with a means of continuing to fish for small-mesh species without catching groundfish. Raised-footrope trawls fish about 0.5 to 0.6 m above the bottom (Carr and Milliken 1998). Although the doors of the trawl still ride on the bottom, underwater video and observations in flume tanks have confirmed that the sweep in the raised-footrope trawl has much less contact with the seafloor than the traditional cookie sweep that it replaces (Carr and Milliken 1998).

6.1.4.3 Gillnet Gear

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

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

6.1.4.4 Hook and Line Gear

6.1.4.4.1 Hand Lines/Rod and Reel

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

6.1.4.4.2 Mechanized Line Fishing

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

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

6.1.4.5 Longlines

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

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

6.1.4.6 Gear Interaction with Habitat

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

Amendment 13 (NEFMC 2003) describes the general effects of bottom trawls on benthic marine habitats. The primary source document used for this analysis was an advisory report prepared for the International Council for the Exploration of the Seas (ICES) that identified a number of possible effects of beam trawls and bottom otter trawls on benthic habitats (ICES 2000). This report is based on scientific findings summarized in Lindeboom and de Groot (1998), which were peer-reviewed by an ICES working group. The focus of the report is the Irish Sea and North Sea, but it also includes assessments of effects in other areas. Two general conclusions were: 1) low-energy environments are more affected by bottom trawling;

and 2) bottom trawling affects the potential for habitat recovery (i.e., after trawling ceases, benthic communities and habitats may not always return to their original pre-impacted state). Regarding direct habitat effects, the report also concluded that:

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

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

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

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

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

Trawling reduces habitat complexity;

Repeated trawling results in discernable changes in benthic communities;

Bottom trawling reduces the productivity of benthic habitats; and

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

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

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

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

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

6.2 Target Species

This section describes the species life history and stock population status for each of the 20 fish stocks that are managed under the Northeast Multispecies FMP that would be harvested by the groundfish fishery under provisions of the FMP. The description of species habitat associations described in Section 5.1.2 provides context for considering the interactions between gear and species. A comparison of depth-related demersal fish assemblages of Georges Bank and the Gulf of Maine is also provided for additional context. The discussion of allocated target species is concluded with an analysis of the interaction between the gear types the fishery will use (as described in Section 5.1.4) and allocated species. Most of the following discussions have been adapted largely from the GARM III report (NEFSC 2008) and can be accessed via the NEFMC website at http://www.nefmc.org.

6.2.1 Species and Stock Status Descriptions

The allocated target stocks for the fishery are:

Gulf of Maine (GOM) Cod

Georges Bank (GB) Cod

GOM Haddock

GB Haddock

Redfish

Pollock

White Hake

Cape Cod/GOM Yellowtail Flounder

GB Yellowtail Flounder

SNE/MA Yellowtail Flounder

GOM Winter Flounder

GB Winter Flounder

SNE/MA Winter Flounder

Witch Flounder

American Plaice

Northern Windowpane Flounder

Southern Windowpane Flounder

Ocean Pout

Halibut

Atlantic Wolffish

Other species potentially affected by the Proposed Action are:

Spiny Dogfish

Skates

Monkfish

Spiny dogfish, skates, and monkfish may be affected by the Proposed Action and are considered in this EA as non-allocated bycatch in Section 5.3. These species are not allocated under the Northeast Multispecies FMP and are managed under their respective FMPs.

Atlantic halibut, ocean pout, windowpane flounder, and SNE/Mid-Atlantic winter flounder do not have sector allocations but are also managed under the Northeast Multispecies FMP. Sector and Common Pool vessels are permitted to retain 1 halibut per trip. Wolffish has been provisionally added to the list of stocks not allocated under the Northeast Multispecies FMP. These species stocks are addressed in Amendment 16 to the Northeast Multispecies FMP (NEFMC 2009a), and are not considered further within this EA.

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 Northwest, 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, which is related 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 10 and 150 m and at temperatures between 0 and 10°C. Spawning occurs near bottom during winter and early spring, usually in water temperatures between 5 and 7°C. Eggs are pelagic, buoyant, spherical, and transparent, and drift for 2 to 3 weeks before hatching. The larvae are also pelagic until reaching 4 to 6 cm in about 3 months, at which point descending 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 occurring in the water column. Spawning occurs year-round, with a peak in winter and spring. Peak spawning is related to environmental conditions. It is delayed until spring when winters are severe and peaks in winter when mild.

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 1990s from 11,100 mt in 1997 to 34,000 mt in 2007, but the stock remains low relative to historic levels. The stock is not overfished, but overfishing is occurring.

6.2.1.2 Georges Bank Cod

Life History: The GB cod stock 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 10 and 150 m and at temperatures between 0 and 10°C. Spawning occurs near bottom during winter and early spring, usually in water temperatures between 5 and 7°C. Eggs are pelagic, buoyant, spherical, and transparent and drift for 2 to 3 weeks before hatching. The larvae are also pelagic until reaching 4 to 6 cm in about 3 months, at which point descending to the bottom. 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, also occurring in the water column. Spawning occurs year-round, with a peak in winter and spring. Peak spawning is related to environmental conditions. It is delayed until spring when winters are severe and peaks in winter when mild.

Population Status: GB Atlantic cod is a transboundary stock that is harvested by both the U.S. and Canadian fishing fleets. The GB Atlantic 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 northwest and northeast Atlantic Ocean. This demersal gadoid species is distributed from Cape May, New Jersey to the Strait of Belle Isle, Newfoundland in the northwest Atlantic, where a total of six distinct haddock stocks have been identified. Two of these haddock stocks are found in U.S. waters associated with Georges Bank and Gulf of Maine.

Haddock spawn over various substrates including rocks, gravel, smooth sand, and mud. Eggs are broadcast and fertilized near the bottom. 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 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. Once suitable bottom habitat is located, juveniles settle into a demersal existence. Haddock do not make extensive seasonal migrations. In winter, haddock prefer deeper waters and tend to move shoreward in summer. Haddock are highly fecund broadcast spawners. Eggs are released near the ocean bottom in batches and fertilized by a courting male. 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. In the Gulf of Maine, Jeffreys Ledge and Stellwagen Bank are the two primary spawning sites.

Population Status: Based on the current assessment, the GOM haddock stock is not overfished and overfishing is not occurring.

6.2.1.4 Georges Bank Haddock

Life History: The general life history of GB haddock 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. continental shelf ecosystem. GB haddock spawning is concentrated 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 Gulf of Maine fishery does not target haddock and is directed mostly at flatfish for which the fleet uses large square (6.5 in) mesh gear, which leads to reduced selectivity on haddock. The Gulf of Maine haddock have lower weights at age than the Georges Bank stock and the age at 50 percent maturity was also lower for Gulf of Maine as compared to Georges Bank haddock.

Population Status: The GB haddock stock is a transboundary resource, which is co-managed with Canada. Substantial declines have recently occurred in the weights at age due to slower than average growth, particularly of the 2003 year-class. This 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.

6.2.1.5 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 where Acadian redfish appear to be the sole representative of the genus Sebastes. Acadian redfish inhabiting the waters of the Gulf of Maine and deeper portions of Georges Bank and the Great South Channel are managed as a unit stock in U.S. waters.

The redfish is a slow growing, long-lived, ovoviviparous species with an extremely low natural mortality rate. Redfish eggs are fertilized internally, 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 10 to 25 millimeters (mm). The post-larvae descend below the thermocline when about 25 mm in length. Young-of-the-year are pelagic until reaching 40 to 50 mm at 4 to 5 months old, at which point moving to the bottom, typically by early fall of their first year. Redfish of 22 cm or greater are considered adults. As a general rule, the size of landed redfish is positively correlated with depth. The reason for this may involve differential growth rates of stocks, confused species identification (deepwater redfish are a larger species), size-specific migration, gender-specific migration (females are larger), or a combination of these factors. Redfish make diurnal vertical migrations linked to their primary euphausiid prey. Nothing is known about redfish breeding behavior, but fertilization is internal and fecundity is relatively low.

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

6.2.1.6 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 the species between the Scotian Shelf, Georges Bank, and the Gulf of Maine. Pollock eggs are buoyant, rising into the water column after fertilization. The pelagic larval stage lasts for 3 to 4 months, at which 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 are found throughout the water column. With the exception of short migrations due to temperature changes and north-south movements for spawning, 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, a trend that has also been reported in other marine fish species (e.g., haddock, witch flounder). 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 8^{o}C, and peaks when temperatures are approximately 4.5 to 6^{o}C. Thus, most spawning occurs within a comparatively narrow range of temperatures.

Population Status: The stock is overfished and overfishing is occurring.

6.2.1.7 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; juveniles typically occupy shallower areas than adults, but individuals of all ages tend to move inshore or shoalward in summer, dispersing to deeper areas in winter. Larval distributions indicate the presence of two spawning groups in the Gulf of Maine, Georges Bank, and Scotian Shelf region, one which spawns in deep water on the continental slope in late winter and early spring, and a second that spawns on the Scotian Shelf in the summer. The eggs, larvae, and early juveniles are pelagic; older juveniles and adults are demersal. The eggs are buoyant. Pelagic juveniles become demersal at 50 to 60 mm total length. The pelagic juvenile stage lasts about two months. White hake attain a maximum length of 135 cm and weigh up to 22 kg; females are larger than males. 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.

Population Status: The stock is overfished and overfishing is occurring.

6.2.1.8 Cape Cod/Gulf of Maine Yellowtail Flounder

Life History: The yellowtail flounder, *Limanda ferruginea*, is a demersal flatfish distributed from Labrador to Chesapeake Bay generally at depths between 40 and 70 m. Off the U.S. coast, three stocks are considered for management purposes including Cape Cod/GOM, GB, and SNE/MA stocks. In the northwest Atlantic, spawning occurs from March through August at temperatures of 5 to 12°C. Yellowtail flounder spawn buoyant, spherical, pelagic eggs that lack an oil globule. Pelagic larvae are brief residents in the water column; transformation to the juvenile stage occurs at 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. Spawning takes place along continental shelf waters northwest of 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 is currently at the lowest level observed in the time series. Spawning stock biomass has increased the past few years.

6.2.1.9 Georges Bank Yellowtail Flounder

Life History: The general life history of the GB yellowtail flounder 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 continues to be overfished overfishing is continuing.

6.2.1.10 Southern New England/Mid-Atlantic Yellowtail Flounder

Life History: The general life history of the SNE/MA yellow tail flounder 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: The SNE/MA yellowtail flounder continues to be overfished and overfishing is still occurring. However, fishing mortality has been declining since 2005 and it is at lowest levels observed in the time series.

6.2.1.11 Gulf of Maine Winter Flounder

Life History: The winter flounder, *Psuedopleuronectes americanus*, is a demersal flatfish distributed in the northwest Atlantic from Labrador to Georgia. Important U.S. commercial and recreational fisheries exist from the Gulf of Maine to the Mid-Atlantic Bight. In U.S. waters, the resource is assessed and managed 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. After spawning, adults typically leave inshore areas when water temperatures exceed 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, when the left eye migrates to the right side of the body and the larvae become “flounder-like,” begins around 5 to 6 weeks after hatching, and is completed by the time the larvae are 8 to 9 mm in length at about 8 weeks after hatching. Off southern New England, newly metamorphosed young-of-the-year winter flounder take up residence in shallow water where individuals may grow to about 100 mm within the first year. Winter flounder spawn from winter through spring, with peak spawning occurring during February and March in Massachusetts Bay and south of Cape Cod, and somewhat later along the coast of Maine, continuing into May.

Population Status: The GOM winter flounder stock is the smallest of the three winter flounder stocks. None of the assessment models presented in GARM III were accepted and the stock’s status could not be determined. The review panel “… generally agreed that it is highly likely that biomass is below BMSY, and that there is a substantial probability that it is below ½ BMSY.” There is high uncertainty on the status determination. This is consistent with biomass trends in the other flatfish stocks.

6.2.1.12 Georges Bank Winter Flounder

Life History: The life history of the GB winter flounder is comparable to the GOM winter flounder as described above.

Population Status: The stock is overfished condition and overfishing is occurring.

6.2.1.13 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 is closely associated with mud or sand-mud bottom. In U.S. waters, witch flounder are common throughout the Gulf of Maine, in deeper areas on and adjacent to Georges Bank., and along the shelf edge as far south as Cape Hatteras, North Carolina. Witch flounder are assessed 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 0 to10^{o}C.

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

6.2.1.14 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 spawn buoyant eggs, which lack oil globules. Transformation of the larvae and migration of the left eye begins when the larvae are approximately 20 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. American plaice have been categorized as batch spawners. Eggs are released in batches every few days over the spawning period. Adults spawn and fertilize their eggs at or near the bottom. Eggs drift into the upper water column after released. Eggs float and hatch at the surface and the amount of time between fertilization and hatching varies with water temperature. A large amount of time could pass before young fish finally settle to the bottom. In U.S. and Canadian waters, American plaice is regarded as 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.

6.2.1.15 Northern Windowpane Flounder

Life History

Windowpane or sand flounder, *Scophthalmus aquosus*, is a thin bodied, left eyed flatfish species distributed in the northwest Atlantic from the Gulf of St. Lawrence to Florida (Bigelow and Schroeder 1953). Windowpane prefer sandy bottom habitats and are most abundant from Georges Bank to the southern tip of Virginia. Windowpane occur in bays and estuaries at depths from the shoreline to 60 m. On Georges Bank, the species is most abundant on the shoals (depths < 60 m) during late spring through autumn but overwintering occurs in deeper waters out to 366 m (Chang et al. 1999). Spawning begins in February or March in inner shelf waters and extends onto Georges Bank in the summer. Fish grow quickly and reach a maximum length of about 46 cm. Sexual maturity occurs at 3-4 years of age and a median length of 22 cm. (females). (http://www.nefsc.noaa.gov/sos/spsyn/fldrs/window/)

Population Status: The GOM/GB (or Northern) Windowpane Flounder stock was overfished and overfishing was occurring in 2007.

6.2.1.16 Southern Windowpane Flounder

Life History: The life history of this stock is similar to that for GOM/GB windowpane flounder. There is evidence of a split spawning season, spring and winter.

Population Status: In 2007 this stock was not overfished but overfishing was occurring.

6.2.1.17 Ocean Pout

Life History: The ocean pout, *Zoarces americanus*, is a demersal eel-like species found in the Northwest Atlantic from Labrador to Delaware. In US waters, ocean pout are assessed as a unit stock from Gulf of Maine/Cape Cod Bay south to Delaware. Ocean pout may attain lengths up to 98 cm (39 in.) and weights of 5.3 kg (14.2 lb). Ocean pout prefer depths of 15 to 80 m (8 to 44 fm.) and temperatures of 6° to 7° C (43° to 45° F). Tagging studies and NEFSC bottom trawl survey data indicate that ocean pout do not undertake extensive migrations, but rather move seasonally to different substrates. During this period, ocean pout are not available to commercial fishing operations. Typically, catches increase when adults return to their feeding grounds in late autumn and winter. Median length at maturity for females was 26.2 cm and 31.3 cm for the Gulf of Maine area and Southern New England area, respectively, with a possible three-year egg development period. (http://www.nefsc.noaa.gov/sos/spsyn/og/pout/)

Population Status: In 2007 the stock was overfished but was not experiencing overfishing.

6.2.1.18 Southern New England//Mid-Atlantic Winter Flounder

Life History: The life history of this stock is similar to that for GOM winter flounder. Spawning occurs in late winter and early spring (November to April) after migrations inshore.

Population Status: In 2007 this stock was overfished and overfishing was occurring.

6.2.1.19 Atlantic Wolffish

Life History: Atlantic wolffish (*Anarhichas lupus*) are distributed on both sides of the North Atlantic Ocean. In the Georges Bank-Gulf of Maine region, abundance is highest in the southwestern portion at depths of 80 to 120 m, but wolffish are also found in waters from 40 to 240 m. Atlantic wolffish are sedentary and mostly solitary in habit, except during mating. They seem to prefer complex benthic habitats with large stones and rocks which provide shelter. The diet of Gulf of Maine Georges Bank wolffish consists primarily of bivalves, gastropods, decapods and echinoderms. Little is known about the biology, migration patterns or seasonal movements of Atlantic wolffish in the Gulf of Maine Georges Bank region. Peak spawning period is believed to occur from September to October. In the Gulf of Maine Georges Bank region individuals may attain lengths of 150 cm and weights of 18 kg (http://www.nefsc.noaa.gov/sos/spsyn/og/wolf/).

Population Status: In 2008 this stock was overfished. It could not be determined if overfishing was occurring.

6.2.2 Assemblages of Fish Species

Georges Bank and the Gulf of Maine have been historically characterized by high levels of fish production. Several studies have attempted to identify demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth-related groundfish assemblages for Georges Bank and the Gulf of Maine that were persistent temporally and spatially. Depth and salinity were identified as major physical influences explaining assemblage structure. Gabriel (1992) identified six assemblages, which are compared with the results of Overholtz and Tyler (1985) in Table 14 (adapted from Amendment 16). For the Affected Area, including southern New England, these assemblages and relationships are considered to be relatively consistent for purposes of general description. The assemblages include allocated target, non-allocated target, and bycatch species. As presented in Table 14, the terminology and definitions of habitat types varies slightly between the two studies. For further information on fish habitat relationships, see Table 12.

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

Of the 19 groundfish stocks (including all management units of each species) included in the GARM III report (NEFSC 2008), benchmark assessments indicated that six stocks were fished below the fishing mortality rate that would produce maximum sustainable yield (F_{MSY}) (or its proxy) in 2007 and 13 were above (Table 15). The F_{MSY} is the fishing mortality rate (F) that produces the maximum sustainable yield (MSY), defined as the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions (National Standards Guidelines 50 CFR 600.310). The most recent information regarding stock assessments is provided by the GARM III Report and can be accessed via the NEFMC website at http://www.nefmc.org. The information in this section is largely adapted from that report. The 19 groundfish stocks include the 14 allocated target stocks managed under the Northeast Multispecies FMP as well as non-allocated target stocks and additional bycatch stocks that may all be impacted to various degrees by groundfish fishing activities.

The results of GARM III show stocks of ocean pout and Atlantic halibut are being fished at a sustainable level, but the biomass indicates stocks have not yet been rebuilt and are considered to be overfished. Stocks of haddock have been rebuilt which indicates Amendment 13 and FW 42 management actions have had positive effects on certain groundfish stocks. All other groundfish stocks are still experiencing overfishing, indicating the need for additional management measures.

Table 15 – Status of the Northeast Groundfish Stocks in 2007 (GARM III)

Stock Status	**Stock Status (GARM III)**
Overfished and Overfishing Biomass < ½ B_{MSY} and F > F_{MSY}	GB Cod GB Yellowtail SNE/MA Yellowtail GOM/Cape Cod Yellowtail SNE/MA Winter Flounder White Hake Pollock Witch Flounder GB Winter Flounder Northern Windowpane
Overfished but not Overfishing Biomass < ½ B_{MSY} and F < F_{MSY}	Ocean Pout Halibut Atlantic wolffish (overfished but unknown if overfishing is occurring)
Not Overfished but Overfishing Biomass > ½ B_{MSY} and F > F_{MSY}	GOM Cod Southern Windowpane
Not Overfished and not Overfishing Biomass > ½ B_{MSY} and F < F_{MSY}	Redfish Plaice GB Haddock GOM Haddock
Unknown	GOM winter flounder

6.2.4 Areas Closed to Fishing within the Groundfish Fishery Area

Select areas are closed to some level of fishing to protect the sustainability of fishery resources. The designation of long-term closures has resulted in the removal or reduction of fishing effort from important fishing grounds, with an expected result that fishery-related mortalities to stocks utilizing the closed areas may have been reduced.

Figure 6 shows the Closed Areas for:

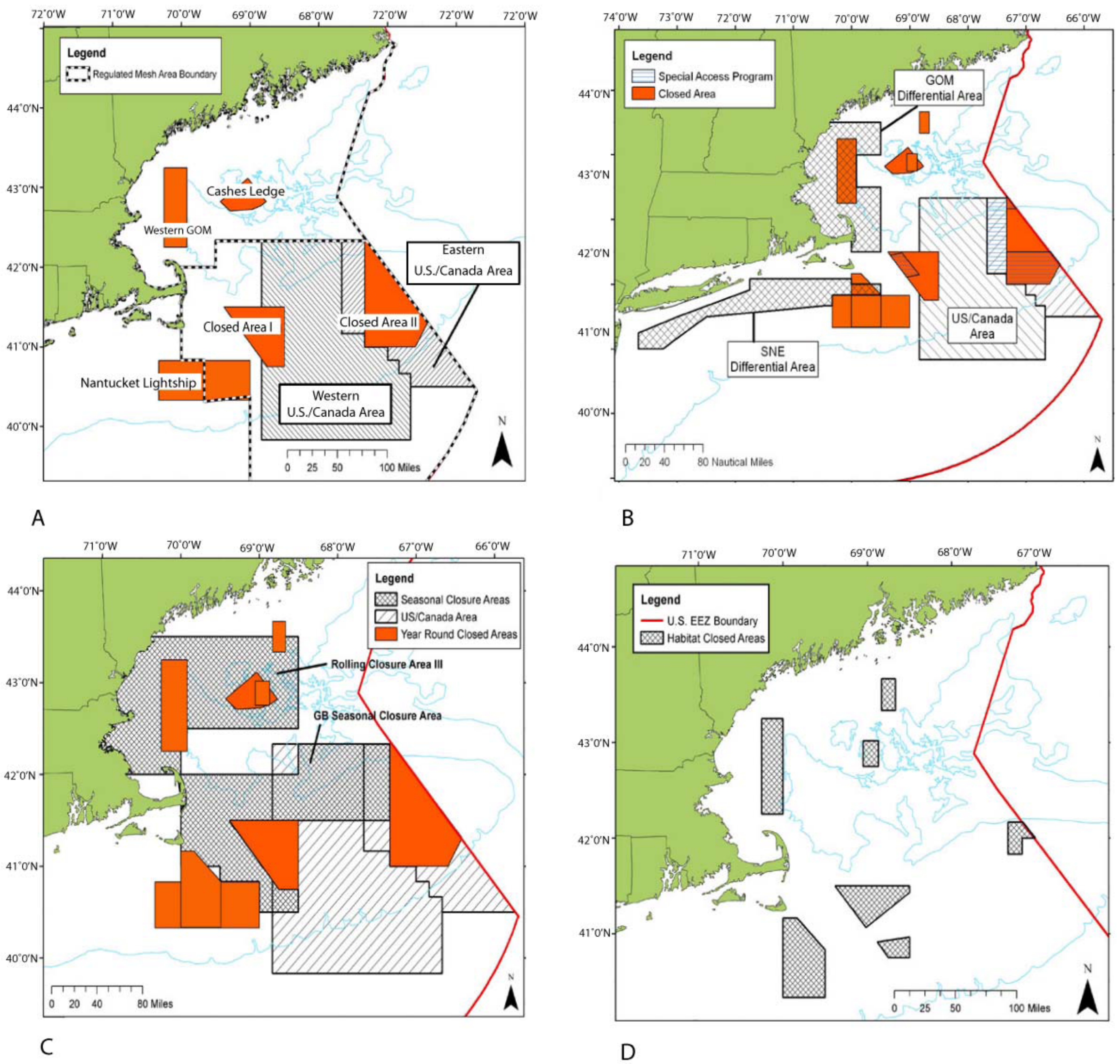
A. Northeast Multispecies Closed Areas and U.S./Canada Management Area;

B. Northeast Multispecies Differential Days-at-Sea Areas, Closed Areas, Special Access Programs, and the U.S./Canada Management Area;

C. Northeast Multispecies May Seasonal Closures Overlaid on Northeast Multispecies Closed Areas and the U.S./Canada area; and

D. Essential Fish Habitat Closure Areas.

Figure 6 - Northeast Multispecies Closed Areas and United States/Canada



6.2.5 U.S./Canada Fishery Information

U.S./Canada TACs

The U.S. TACs have varied over time due to primarily the change in the percentage shares allocated to the U.S. under the Sharing Understanding and the stock conditions (fishing mortality and biomass status). The stock conditions exert the dominant influence on the size of the TACs, and it should be noted that in some years, there is relatively high scientific uncertainty regarding stock size (see Transboundary Resource Assessment Committee documents). Despite the change in the weighting formula involving current distribution and historic catch from 60/40 to 85/15 (from 2004 through 2009, respectively), the percentage shares have not varied substantially. The U.S. shares of cod and haddock increased, while the share of yellowtail decreased then increased.

Table 16 – U.S./Canada TACs (mt) and Percentage Share by Year

Year	**TAC Type**	**Cod**	**Haddock**	**Yellowtail Flounder**
2009 85/15	Total Shared TAC U.S. TAC Canada TAC	1,700 527 (31 %) 1,173 (69 %)	30,000 11,100 (37 %) 18,900 (63 %)	2,100 1,617 (77 %) 483 (23 %)
2008 80/20	Total Shared TAC U.S. TAC Canada TAC	2,300 667 (29 %) 1,633 (71 %)	23,000 8,050 (35 %) 14,950 (65 %)	2,500 ** 1,950 (78 %) 550 (22 %)
2007 75/25	Total Shared TAC U.S. TAC Canada TAC	1,900 494 (26 %) 1,406 (74 %)	19,000 6,270 (33 %) 12,730 (67 %)	1,250 900 (72 %) 350 (28 %)
2006 70/30	Total Shared TAC U.S. TAC Canada TAC	1,700 374 (22 %) 1,326 (78 %)	22,000 7,480 (34 %) 14,520 (66 %)	3,000 2,070 (69 %) 930 (31 %)
2005 65/35	Total Shared TAC U.S. TAC Canada TAC	1,000 260 (26 %) 740 (74 %)	23,000 7,590 (33 %) 15,410 (67 %)	6,000 4,260 (71 %) 1,740 (29 %)
2004 60/40	Total Shared TAC U.S. TAC Canada TAC	1,300 300 (23 %) 1,000 (77 %)	15,000 5,100 (34 %) 9,900 (66 %)	7,900 6,000 (76 %) 1,900 (24 %)

* Weighting formula: x/y resource distribution/utilization
* * Adjusted downward to 1,868.7 mt due to overharvest of 2007 TAC

U.S. Catch from Shared Stocks

The catch of Eastern GB cod, and haddock, and GB yellowtail flounder have varied due the availability of TAC, pertinent regulations, fish availability, market conditions and other factors. For example, particularly notable is the large FY 2004 catch of GB yellowtail flounder that resulted from the large TAC and the opening of the Closed Area II Yellowtail Flounder Special Access Program. Since 2004, the haddock TAC has not been a limiting factor, whereas access to the eastern U.S./Canada Area was limited multiple times by closures as a result of the projected attainment of the yellowtail and cod TACs. In only one instance has one of the TACs been exceeded. In FY 2007, the GB yellowtail TAC was overharvested by 9 percent as a result of late reporting, and relatively slow accounting of yellowtail catch by the scallop fleet (from outside scallop access areas). Since that time, NMFS modified its monitoring to improve the timelines of such data. The methodology of estimating catch and discards is described in detail in an unpublished paper (Caless, Wilhelm and Wang, 2005), as well as in NMFS's annual summary memoranda. Note, for cod and haddock, for trips that fished both inside and outside of the Eastern U.S./Canada Area, in-season monitoring attributed all fish caught on such trips towards the TAC. Because such trips include fish caught both inside and outside of the Eastern U.S./Canada Area, for 2006, the final catch numbers were adjusted downward to reflect only fish caught inside the Eastern Area. All final catch numbers include adjustments made to reflect live weight, as well as adjustments made to account for the discrepancy between vessel monitoring system data and dealer data.

Pursuant to Regional Administrator authority to modify certain measures to optimize catch (neither under-harvest, nor over-harvest the TACs), NMFS has relied upon three management tools: modifications to the cod and yellowtail trip limits, closures to the eastern U.S./Canada Area, and prohibition on the use of flatfish nets. For the 2008 and 2009 fishing years, the Council recommended, and NMFS implemented a delay in the opening of the Eastern U.S./Canada Area for vessels fishing with trawls, in order to avoid trawl fishing during the season when the cod catch rate is usually high.

During FYs 2004-2009 there were several Special Access Programs (SAPs), which provided vessels opportunities to fish in the U.S. Canada Management Area under rules which differed from the generic regulations that apply to the U.S. Canada Management Area. The catch under each of the SAPs (kept and discarded) counted toward the pertinent U.S. TAC specified for each FY (cod, haddock, and yellowtail flounder), and were consistent with the Understanding.

Table 17 – U.S. Catch from Shared Stocks

Cod				
Fishing Year	TAC (mt)	Catch (% of TAC)	Catch (mt)	Discards (% of catch)
2004	300	59 %	177	23 %
2005	260	94 %	244	64 %
2006	374	90 %	335	50 %
2007	494	64 %	315	67 %
2008	667	75 %	501	15 %

Haddock				
Fishing Year	TAC (mt)	Catch (% of TAC)	Catch (mt)	Discards (% of catch)
2004	5,100	21 %	1,060	18 %
2005	7,590	8 %	589	12 %
2006	7,480	9 %	671	37 %
2007	6,270	5 %	307	46 %
2008	8,050	20 %	1,649	4 %

Yellowtail Flounder				
Fishing Year	TAC (mt)	Catch (% of TAC)	Catch (mt)	Discards* (% of catch)
2004	6,000	98 %	5,852	8 %
2005	4,260	88 %	3,760	9 %
2006	2,070	89 %	1,851	29 %
2007	900	109 %	981	39 %
2008	1,869	82 %	1,531	28 %

* Note; yellowtail discard % includes groundfish and scallop fishery discards

Table 18 – Summary of Numbers of Trips and DAS* in U.S./Canada Management Area

Fishing Year	Trips			Days-at-Sea		
	Total	West	East	Total	West	East
2004	1,910	1,424	468	9,805	7,808	1,997
2005	2,176	1,963	213	14,368	13,287	1,081
2006	1,579	1,295	284	9,282	7,907	1,375
2007	1,272	1,134	138	10,950	10,264	686
2008	1,273	559	714	8,990	4,804	4,186

* A, B regular, and B reserve groundfish DAS,

Table 19 – Number of Distinct Vessels that Fished in the U.S./Canada Management Area

Fishing Year	Western Area	Eastern Area	East and West
2004	159	110	162
2005	184	78	184
2006	155	92	161
2007	148	59	151
2008	126	92	147

Table 20 – Estimates of Observer Coverage in U.S./Canada Area (percent of trips)

Fishing Year	Approximate Percentage
2006	19 %
2007	26 %
2008	29 %

Table 21 – Canadian Catch from Shared Georges Bank Stocks

Cod				
	TAC (mt)	Catch (% of TAC)	Catch (mt)	**Discards**
2004	1,000	111 %	1,112	unknown
2005	* 640 (740)	98 %	627	unknown
2006	1,326	109 %	1,448	24 %
2007	* 1,275 (1,406)	94 %	1,195	125 mt from scallopers
2008	1,173	94 %	1,529	31 mt from scallopers

* Adjusted downward to account for previous year's overharvest

Haddock				
	TAC (mt)	Catch (% of TAC)	Catch (mt)	Discards
2004	9,900	98 %	9,745	unknown
2005	15,410	94 %	14,483	unknown
2006	14,520	83 %	12,054	
2007	12,728	94 %	11,951	61 mt from scallopers
2008 (prelim)	18,900	99 %	14,815	30 mt from scallopers

Yellowtail Flounder				
	TAC (mt)	Catch (% of TAC)	Catch (mt)	Discards
2004	1,900	< 1 %	95	unknown
2005	1,740	< 1 %	29	unknown
2006	930	62 %	580	
2007	350	38 %	132	105 mt from scallopers
2008 (prelim)	483	29 %	158	45 mt from scallopers

Table 22 – Summary of Georges Bank Yellowtail Flounder Catch by Scallop Fishery (based on NMFS/FSO end of fishing year summary reports for US/CA Area; includes both scallop access area and open areas on GB)

Year	2005	2006	2007	2008	* 2009
Landings	2,000 lb	16,000 lb	1,100 lb	10,000 lb	6,766 (access area)
Discards	470,000 lb	949,000 lb	417,000 lb	475,000 lb (6,575,000 meat lb of scallop X 0.072 discard rate for USCA open access scallop trips)	200,196 (open area) 321,120 (access area)
Total	472,000 lb	966,000 lb	419,000 lb	485,000 lb	528,082
Groundfish GB Yellowtail TAC	9,392,000	4,564,000	1,984,000	4,119,779	3,564,875
% of TAC	5%	21%	21%	12 %	15%

* 2009 data through August 16, 2009;

Table 23 – GB Yellowtail Catch from Scallop Access Fishery (from FSO website)

	Kept	Discarded	Total
2009 CA II Scallop Access Area	6,766 lb	321,120 lb	327,886 lb
2007 CA I Scallop Access Area	501 lb	53,387 lb	53,888 lb
2006 CA II Scallop Access Area	7,470 lb	454, 842 lb	462,312

6.2.6 Interaction between Gear and Target Species

The analysis of interactions between gear and allocated species is based on catch information for the Northeast Multispecies FMP Common Pool fishery from FY 1996 through FY 2006 as presented in GARM III. Historic landings for select target species by gear type from FY 1996 through FY 2006 (Table 24) show that the majority of fish of all species are caught with trawls. 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 Other Species

Species likely to be affected by the multispecies fishery include monkfish, skates, and spiny dogfish. These species have no allocation under the Northeast Multispecies FMP and are managed under separate FMPs. The discussion in this section is limited to these three groups of fish. Monkfish and skates are commonly landed when caught. Monkfish may be discarded when regulations or market conditions constrain the amount of the catch that could be landed. Spiny dogfish, which tend to be relatively abundant in catches, may be landed but are often the predominant component of the discarded bycatch.

6.3.1 Monkfish

Life History: Monkfish, *Lophius americanus*, also called goosefish, are distributed in the western North Atlantic from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina. Monkfish may be found from inshore areas to depths of at least 900 m. Seasonal onshore-offshore migrations occur and appear to be related to spawning and possibly to food availability.
Female monkfish begin to mature at age 4, and 50 percent of females are mature by age 5 (about 43 cm). Males mature at slightly younger ages and smaller sizes (50 percent maturity at age 4.2 or 36 cm). Spawning takes place from spring through early autumn, progressing from south to north, with most spawning occurring during the spring and early summer. Females lay a buoyant egg raft or veil which can be as large as 12 m long and 1.5 m wide, and only a few mm thick. The eggs are arranged in a single layer in the veil, and the larvae hatch after about 1 to 3 weeks, depending on water temperature. The larvae and juveniles spend several months in a pelagic phase before settling to a benthic existence at a size of about 8 cm.

Population Management and Status: Monkfish are currently regulated by the Monkfish FMP, which was implemented in 1999 (NEFMC and MAFMC 1998). The FMP was designed to stop overfishing and rebuild the stocks through a number of measures, including: limiting the number of vessels with access to the fishery and allocating DAS to those vessels; setting trip limits for vessels fishing for monkfish; minimum fish size limits; gear restrictions; mandatory time out of the fishery during the spawning season; and a framework adjustment process.

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

Table 24 - Historic landings for groundfish species by gear type from Fishing Year 1996 to Fishing Year 2006 in metric tons (mt) as presented in GARM III.

Stock/species	Trawl	Large-mesh trawl discards	Small-mesh trawl discards	Gillnet	Gillnet discards	Hook/ line	Hook/ line discards	Scallop dredge	Scallop dredge discards	Other	Other discards	Total discards	Total landings
Georges Bank Cod		2,742	551						170			2,862	73,806
Georges Bank Haddock	38,989	3,950		883	61	2,461	380		31	297		4,423	42,626
Georges Bank Yellowtail Flounder		1,280	134						2,562			3,976	27,960
So. New England/Mid-Atlantic Yellowtail Flounder		725	129						1,119			1,972	7,968
Gulf of Maine/Cape Cod Yellowtail Flounder		1,123	33		510				944			2,611	15,796
Gulf of Maine Cod	22,435	5,301		17,532	4,036					3,639		9,337	43,606
Witch Flounder		1,911	469								71	2,481	27,031
American Plaice		3,059	1,237								350	4,533	31,031
Gulf of Maine Winter Flounder	4,479	259	54	1,346	163					168		476	5,993
So. New England/Mid-Atlantic Winter Flounder[a]												1,481	31,146
Georges Bank Winter Flounder	18,202	169	47					210	418	135		634	18,546

Stock/species	Trawl	Large-mesh trawl discards	Small-mesh trawl discards	Gillnet	Gillnet discards	Hook/ line	Hook/ line discards	Scallop dredge	Scallop dredge discards	Other	Other discards	Total discards	Total landings
White Hake	22,532			9,355	239					2,191		2,173	32,547
Pollock												N/A	51,568
Acadian Redfish												6,200	4,115
Ocean Pout[a]												5,165	207
Gulf of Maine Haddock	6,396	5	0.49	1,091	1					969	2		8,456
Atlantic Halibut [a]												157	138
Gulf of Maine/Georges Bank Windowpane [a]	1,966	3,584	403	4				3	615	7		4,850	1,978
Southern New England/Mid-Atlantic Windowpane [a]	1,071	1,762	433	3				1	1,004	18		3,197	1,093
Atlantic Wolffish[b]													

Notes:

[a] as adopted by the NEFMC June, 2009

[b] provisionally added to list of stocks not allocated

6.3.2 Skates

Life History: The seven species in the Northeast Region (Maine to Virginia) 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 most common skate in the Gulf of Maine, on Georges Bank, and in southern New England. In the Northeast Region, the center of distribution for the little and winter skates is Georges Bank and southern New England. The thorny and smooth skates are commonly found in the Gulf of Maine. The clearnose and rosette skates have a more southern distribution, and are found 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, moving offshore in summer and early autumn and returning inshore during winter and spring. Members of the skate family lay eggs that are 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: The Skate FMP was implemented in September 2003 with a primary requirement for mandatory reporting of skate landings by species by both dealers and vessels. Possession prohibitions of barndoor, thorny, and smooth skates in the Gulf of Maine were also provisions of the FMP. A trip limit of 10,000 pounds (lbs) was implemented for winter skate with a Letter of Authorization for the bait fishery (little skate) to exceed the trip limit. Draft Amendment 3 and the Draft Environmental Impact Statement (DEIS) to the Skate FMP updates and supplements the original EIS for the skate fishery and serves as a Stock Assessment and Fishery Evaluation (SAFE) Report (http://www.nefmc.org/skates/fmp/fmp.htm).

Skate landings have been reported to be generally increasing since 2000. Due to insufficient information about the population dynamics of skates, there remains considerable uncertainty about the status of skate stocks. The landings and catch limits proposed by Amendment 3 have been reported to 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 is expected to cause skate biomass and future yield to increase.

6.3.3 Spiny Dogfish

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

6.3.3.1 Population Management and Status:

The fishery is managed under a FMP developed jointly by the NEFMC and Mid Atlantic Fishery Management Council (MAFMC) for federal waters and a plan developed concurrently by the Atlantic States Marine Fisheries Commission for state waters. Spawning stock biomass of spiny dogfish declined rapidly in response to a directed fishery during the 1990s. Management measures, initially implemented in 2001, have been effective in reducing landings and reducing fishing mortality. Overfishing is not presently considered to be occurring. Conclusions regarding the overfished and overfishing status of spiny dogfish are strongly dependent on the Northeast Fisheries Science Center spring survey estimates in 2006. Concerns have been raised about the influence of these data (NEFSC 2006a); future surveys would be closely monitored to determine if the 2006 results signal a true increase in abundance (http://www.nefsc.noaa.gov/sos/spsyn/op/dogfish/).

6.3.4 Interaction between Gear and Incidental Catch Species

The analysis of interactions between gear and non-allocated species and by catch is based on catch information for the Northeast Multispecies FMP Common Pool fishery from FY 1996 to FY 2006.

The Final Supplemental Environmental Impact Statement (FSEIS) to Amendment 2 (NEFMC and MAFMC 2003) evaluated the potential adverse effects of gears used in the directed monkfish fishery for monkfish and other federally-managed species and the effects of fishing activities regulated under other federal FMPs on monkfish. The two gears used in the directed monkfish fishery are bottom trawls and bottom gill nets which are described in detail in Section 1.2.1 of Appendix 2 to Amendment 2 to the Monkfish FMP (NEFMC and MAFMC 2003).

Regionally, skates are harvested in two very different fisheries, one for lobster bait and one for wings for food. Vessels tend to catch skates when targeting other species like groundfish, monkfish, and scallops and land them if the price is high enough. Therefore, gear interactions with skate can be expected in the conduct of fishing for groundfish. Detailed information about skate fisheries, gear and conduct can be found in Section 7.6 of the recent NEFMC Amendment to the Skate FMP and accompanying FSEIS (NEFMC 2009b).

Of the non-allocated target species considered in the EA, dogfish have the potential for an interaction with all gear types expected to be used by the groundfish fleet. Historic landings for non-allocated target species from FY 1996 to FY 2007 (Table 25) show that the majority of fish of all species are caught with otter trawls. Only cod and white hake are caught in significant numbers by gillnets. Only haddock are caught in significant numbers by hook and line.

Table 25 - Historic Landings (mt) for other species by gear type from Fishing Year 1996 to Fishing Year 2006[a]

	Gear Type								
	Trawl		Gillnet		Dredge		Other Gear[b]	Total	
Species	land	discard	land	discard	land	discard	land	land	discard
Monkfish	122,700	16,520	7,440	6,526	31,555	16,136	8,811	228,000	35,100
Skates	117,381	189,741	29,711	19,448	38,638	--	4,413	151,505	247,827
Dogfish	24,368	61,914	72,712	39,852	--	--	946	98,026	101,766

Notes:
[a] monkfish 1997-2006, skates 1996-2006, dogfish 1996-2005
[b] discards not available for other gear
Source: Northeast Data Poor Stocks Working Group 2007; Sosebee et al. 2008; NEFSC 2006b.

6.4 Atlantic Sea Scallop Resource

The Atlantic sea scallop, *Placopecten magellanicus* (Gmelin), is a bivalve mollusk ranging from North Carolina to the Gulf of St. Lawrence (Hart and Chute, 2004). Although all sea scallops in the US EEZ are managed as a single stock per Amendment 10, 4 regional components and 6 resource areas are recognized. Major aggregations occur in the Mid-Atlantic from Virginia to Long Island (Mid-Atlantic component), Georges Bank, the Great South Channel (South Channel component), and the Gulf of Maine (Hart and Rago, 2006; NEFSC, 2007). These 4 regional components are further divided into 6 resource areas: Delmarva (Mid-Atlantic), New York Bight (Mid-Atlantic), South Channel, southeast part of Georges Bank, northeast peak and northern part of Georges Bank, and the Gulf of Maine (NEFMC, 2007). Assessments focus on two main parts of the stock and fishery that contain the largest concentrations of sea scallops: Georges Bank and the Mid-Atlantic, which are combined to evaluate the status of the whole stock (NEFMC, 2007).

Sea scallops are generally found in waters less than 20^{o}C and depths that range from 30-110m on Georges Bank, 20-80m in the Mid-Atlantic, and less than 40m in the near-shore waters of the Gulf of Maine. They feed by filtering zoo- and phytoplankton and detritus particles. Sea scallops have separate sexes, reach sexual maturity at age 2, and use external fertilization. Scallops greater than 40mm are considered mature individuals. Spawning generally occurs in late summer and early autumn, although there is evidence of spring spawning as well in the Mid-Atlantic Bight (DuPaul et al., 1989) and limited winter-early spring spawning on Georges Bank (Almeida et al., 1994; Dibacco et al., 1995). Annual fecundity increases rapidly with shell height; individuals younger than 4 years may contribute little to total egg production (MacDonald and Thompson, 1985; NEFMC, 1993; NEFSC, 2007). The pelagic larval stage lasts 4-7 weeks with settlement usually on firm sand, gravel, shells, etc. (Hart and Chute, 2004; NEFMC, 2007; NEFSC, 2007). Recruitment to the NEFSC survey occurs at 40mm shell height (SH) and to the commercial fishery at 90-105mm SH, which corresponds to an age of 4-5 years old (NEFSC, 2007; NEFMC, 2007).

Meat weight can quadruple between the ages of 3 to 5 (NEFSC, 2004; NEFMC, 2007). Meat weight is dependent on shell size, which increases with age, and depth. Meat weight decreases with depth, possibly due to a reduced food supply (NEFSC, 2007). Both the Mid-Atlantic and Georges Bank showed a drop in meat weights between August and October, coinciding with the September-October spawning period (Haynes, 1966; Serchuk and Smolowitz, 1989; NEFSC, 2007). Meat weight of landed scallops may differ from those predicted based on research survey data because: 1) the shell height/meat weight relationship varies seasonally in part because of the reproductive cycle, causing meats collected during the NEFSC survey in July to differ from the rest of the year; 2) commercial fishers concentrate on speed while shucking, leaving some meat on the shell (Naidu, 1987; Kirkley and DuPaul, 1989); and 3) fishers may target areas with relatively large meat weight at shell height, thus increasing commercial weights compared to those on the research vessel (NEFSC, 2007).

6.4.1 Assessment

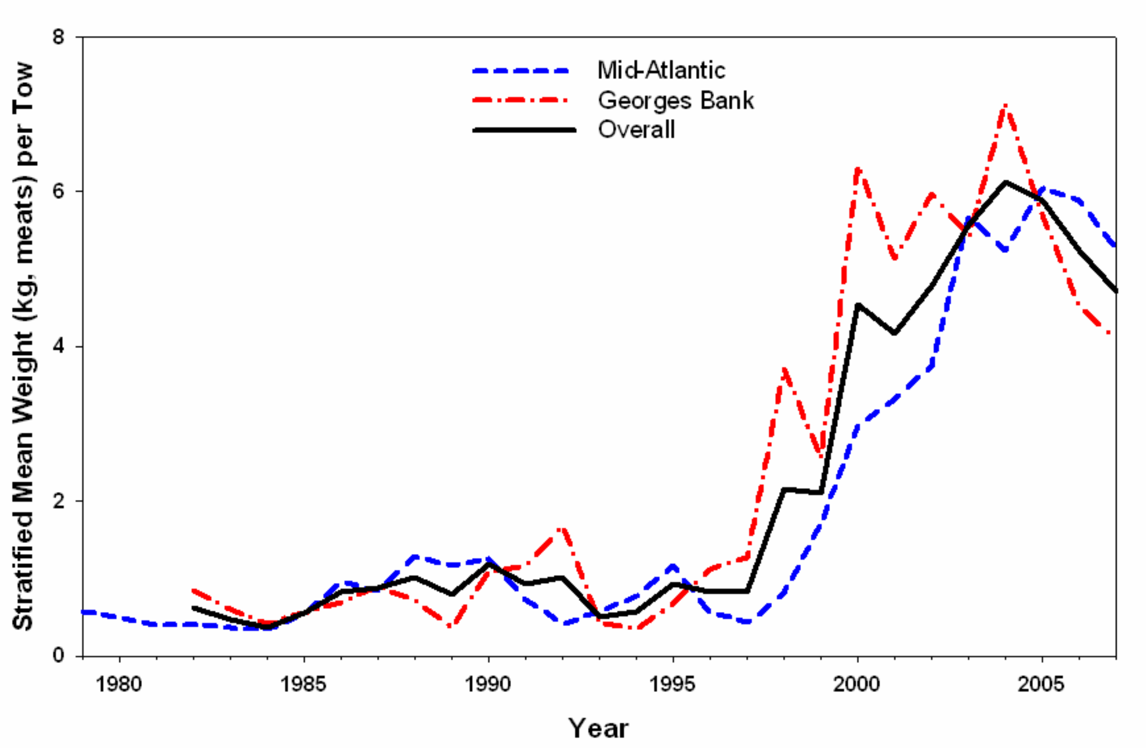
The primary source of data used in the biological component of the scallop assessment currently comes from the federal scallop survey. The scallop dredge survey has been conducted in a consistent manner since 1979. An 8-foot modified scallop dredge is used with 2” rings and a 1.5” liner. Tows are 15 minutes in length at a speed of 3.8 knots, and stations are identified using a random-stratified design. About 500 stations are completed each year on Georges Bank and the Mid-Atlantic. A Scallop Survey Advisory Panel (SSAP) is reviewing the scallop survey and making recommendations about how future surveys should be conducted. The vessel platform used in the past (R/V Albatross IV) went out of service in 2008. The 2008 and 2009 resource surveys were conducted on the R/V Hugh Sharp owned by the University of Delaware. The 2009 surveys were conducted six weeks earlier than previous surveys in hopes that the data would be available in time for 2010 management actions. Calibration tows have been conducted with the WHOI HabCam, in order to use this video survey in future projections.

Other primary components of the assessment include defining parameters for scallop growth, maturity and fecundity, shell height/meat weight relationships, recruitment, and estimates of natural mortality, which are all combined with fishery data (landing and discards) to estimate fishing mortality rates and biological reference points. The per-recruit reference points F_{max} and B_{max} are used by managers as proxies for F_{msy} and B_{msy} because the stock-recruitment relationship is not well defined. The Catch-At-Size-Analysis (CASA) model utilizes additional information including commercial catch, LPUE, commercial shell height compositions, data from the NMFS sea scallop and winter trawl surveys, data from the University of Massachusetts Dartmouth School of Marine Science and Technology (SMAST) small camera video surveys, data from dredge surveys conducted by VIMS, growth increment data from scallop shells, and shell height/meat weight data adjusted to take commercial practices and seasonality into account (NEFSC, 2007).

Based on the results of the last stock assessment workshop, biological reference points have been set for the entire US sea scallop stock. The threshold fishing mortality rate for fully-recruited scallops that generates the maximum yield-per-recruit, F_{max}, was estimated at 0.37. The biomass target is 108.6 thousand mt meats and the recommended biomass threshold is half the biomass target, or 54.3 thousand mt meats.

In general, scallop biomass has increased dramatically in recent years. Figure 7 shows this increase in terms of estimated Mid-Atlantic, Georges Bank and total scallop biomass based on the scallop survey through 2007. These values are unadjusted; therefore cannot be directly compared to biomass thresholds, but the general increasing trend in biomass in both areas is evident.

Figure 7 - Trend in R/V Albatross stratified mean weight per tow from mid 1980s through 2006 by region.



6.4.2 Stock Status

Preliminary results from the Catch at Size Analysis (CASA) model in 2009 estimate an overall fishing mortality of 0.30. Stock status has been fluctuating in recent years. Overall biomass increased almost without interruption since 1997, peaking at 8.2 kg/tow in 2004. Fishing mortality was above the original threshold of 0.24 and target of 0.20 for both 2003 and 2004 with both years at or above 0.30. For 2005, 2006, and 2007, fishing mortality was reduced to 0.22, 0.20, and 0.20 respectively, staying below the threshold value. In 2008 fishing mortality went back up to 0.28, and remained high again in 2009 at 0.30. Thus, it may be found that overfishing is occurring once the updated assessment is completed in 2010. It is therefore likely that a reduction in F of approximately 20% will be needed in 2010.

Additional information on stock status can be found in Framework Adjustment 21 to the Atlantic Sea Scallop Fishery Management Plan (NEFMC 2009b.)

6.5 Protected Resources

There are numerous species that inhabit the environment within the Northeast Multispecies FMP management unit, and that therefore potentially occur in the operations area of the groundfish fishery, that are afforded protection under the Endangered Species Act of 1973 (ESA; i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA), and are under NMFS' jurisdiction. Fifteen species are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA.

6.5.1 Species Present in the Area

Table 26 lists the species, protected either by the ESA, the MMPA, or both, may be found in the environment that would be utilized by the groundfish fishery.

Table 26 - Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery.

Species	Status
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Northern bottlenose whale (*Hyperoodon ampullatus*)	Protected
Beaked whale (*Ziphius and Mesoplodon spp*.)	Protected
Pygmy or dwarf sperm whale (*Kogia spp.)*	Protected
Pilot whale (*Globicephala spp*.)	Protected
False killer whale (*Pseudorca crassidens*)	Protected
Melonheaded whale (*Peponocephala electra*)	Protected
Rough-toothed dolphin (*Steno bredanensis*)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella spp*.)	Protected
Bottlenose dolphin (*Tursiops truncatus*)[a]	Protected
White-beaked dolphin (*Lagenorhynchus albirostris*)	Protected
Harbor Porpoise (*Phocoena phocoena*)	Protected

Table 26 (continued)
Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery.

Species	Status
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered[b]
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Pinnipeds	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Pagophilus groenlandicus*)	Protected
Hooded seal (*Cystophora cristata*)	Protected

Note:
[a] Bottlenose dolphin (Tursiops truncatus), Western North Atlantic coastal stock is listed as depleted.
[b] 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 occurring in U.S. waters.

Two additional species of pinnipeds: Ringed seal (*Phoca hispida*) and the Bearded seal (*Erignathus barbatus*) are listed as candidate species under the ESA. The Northeastern U.S. is at the southern tip of the habitat range for both of these species. These species are rarely sighted off the northeastern U.S., although a few stranding records have been recorded in the Northeast Region, but sightings are rare in the Northeast Atlantic.

6.5.2 Species Potentially Affected

It is expected that the sea turtle, cetacean, and pinniped species discussed below have the potential to be affected by the operation of the multispecies fishery. Background information on the range-wide status of sea turtle and marine mammal species that occur in the area and are known or suspected of interacting with fishing gear (demersal gear including trawls, gillnets, and longline types) can be found in a number of published documents. These include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Marine Turtle Expert Working Group (TEWG) 1998, 2000; NMFS and USFWS 2007a, 2007b; Leatherback TEWG 2007), 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. 2006; 2007), and other publications (e.g., Clapham et al. 1999, Perry et al. 1999, Best et al. 2001, Perrin et al. 2002).

6.5.2.1 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. In general, turtles 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). The trend is reversed in the fall as water temperatures cool. By December, turtles have passed Cape Hatteras, returning 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 are typically observed as far north as Cape Cod whereas the more cold-tolerant leatherbacks are observed 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).

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).

6.5.2.2 Large Cetaceans

The most recent Marine Mammal Stock Assessment Report (SAR) (Waring et al. 2009) reviewed the current population trend for each of these cetacean species within U.S. EEZ waters, as well as providing information on the estimated annual human-caused mortality and serious injury, and a description of the commercial fisheries that interact with each stock in the U.S. Atlantic. Information from the SAR is summarized below.

The western North Atlantic baleen whale species (North Atlantic right, humpback, fin, sei, and minke) follow a general annual pattern of migration from high latitude summer foraging grounds, including the Gulf and Maine and Georges Bank, and low latitude winter calving grounds (Perry et al. 1999, Kenney 2002). However, this is an oversimplification of species movements, and the complete winter distribution of most species is unclear (Perry et al. 1999, Waring et al. 2009). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle et al. 1993, Wiley et al. 1995, Perry et al. 1999, Brown et al. 2002). Blue whales are most often sighted on the east coast of Canada, particularly in the Gulf of St. Lawrence, and occurs only infrequently within the U.S. EEZ (Waring et al. 2002).

In comparison to the baleen whales, sperm whale distribution occurs more on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2006). However, sperm whales distribution in U.S. EEZ waters also occurs in a distinct seasonal cycle

(Waring et al. 2006). Typically, sperm whale distribution is 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).

For North Atlantic right whales, the available information suggests that the population is increasing at a rate of 1.8 percent per year during 1990-2003, and the total number of North Atlantic right whales is estimated to be at least 323 animals in 2003 (Waring et al. 2009). The minimum rate of annual human-caused mortality and serious injury to right whales averaged 3.8 per year during 2002 to 2006 (Waring et al. 2009). Of these, 1.4 per year resulted from fishery interactions. Recent mortalities included six female right whales, including three that were pregnant at the time of death (Waring et al. 2009).

The North Atlantic population of humpback whales is estimated to be 11,570, although the estimate is considered to be negatively biased (Waring et al. 2009). The best estimate for the Gulf of Maine stock of humpback whales is 847 whales (Waring et al. 2009). The population trend was considered positive for the Gulf of Maine population, but there are insufficient data to estimate the trend for the larger North Atlantic population. Based on data available for selected areas and time periods, the minimum population estimates for other western north Atlantic whale stocks are 2,269 fin whales, 207 sei whales, 4,804 sperm whales, and 3,312 minke whales (Waring et al. 2009). No recent estimates are available for blue whale abundance. Insufficient data exist to determine trends for any other large whale species.

The ALWTRP was recently revised with publication of a new final rule (72 FR 57104, October 5, 2007) that is intended to continue to address entanglement of large whales (right, humpback, fin, and minke) in commercial fishing gear and to reduce the risk of death and serious injury from entanglements that do occur.

6.5.2.3 Small Cetaceans

Numerous small cetacean species (dolphins; pygmy and dwarf sperm whales; pilot and beaked, whales; and the harbor porpoise) occur within [the area from Cape Hatteras through the Gulf of Maine]. Seasonal abundance and distribution of each species in [Mid-Atlantic, Georges Bank, and/or Gulf of Maine] waters varies with respect to life history characteristics. Some species primarily occupy continental shelf waters (e.g., white sided dolphins, harbor porpoise), while others are found primarily in continental shelf edge and slope waters (e.g., Risso’s dolphin), and still others occupy all three habitats (e.g., common dolphin, spotted dolphins, striped dolphins). Information on the western North Atlantic stocks of each species is summarized in Waring et al. (2009).

6.5.2.4 Pinnipeds

Of the four species of seals expected to occur in the area, harbor seals have the most extensive distribution with sightings occurring as far south as 30° N (Katona et al. 1993, Waring et al. 2009). Gray seals are the second most common seal species in U.S. EEZ waters, occurring primarily in New England (Katona et al. 1993; Waring et al. 2009). Pupping for both species occurs in both U.S. and Canadian waters of the western north Atlantic with the majority of harbor seal pupping likely occurring in U.S. waters and the majority of gray seal pupping in Canadian waters, although there are at least three gray seal pupping colonies in U.S. waters as well. Harp and hooded seals are less commonly observed in U.S. EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring, and then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch (Waring et al. 2009).

6.5.2.5 Species Not Likely to be Affected

NMFS has determined that the action being considered in the 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. Shortnose sturgeon and salmon belonging to the Gulf of Maine DPS of Atlantic salmon occur within the general geographical areas fished by the multispecies fishery, but they are unlikely to occur in the area where the fishery operates given their numbers and distribution. Therefore, none of these species are likely to be affected by the groundfish fishery. The following discussion provides the rationale for these determinations. Although there are additional species that may occur in the operations area that are not known to interact with the specific gear types that would be used by the groundfish fleet, impacts to these species are still considered due to their range and similarity of behaviors to species that have been adversely affected.

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

The wild populations of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S. - Canada border are listed as endangered under the ESA. These populations include those in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Juvenile salmon in New England rivers typically migrate to sea in May after a 2- to 3-year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn. Results from a 2001 post-smolt trawl survey in Penobscot Bay and 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. 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 approval of this EA would affect the Gulf of Maine DPS of Atlantic salmon given that operation of the groundfish fishery would not occur in or near the rivers where concentrations of Atlantic salmon are likely to be found and groundfishing gear used by the fleet operates in the ocean at or near the bottom rather than near the water surface. Thus, this species is not 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 2009a). Since operation of the multispecies fishery would not occur in waters that are typically used by hawksbill sea turtles, it is highly unlikely that its operations would affect this turtle species.

Blue whales do not regularly occur in waters of the U.S. EEZ (Waring et al. 2009). In the North Atlantic, blue whales are most frequently sighted in the St. Lawrence from April to January (Sears 2002). No blue whales were observed during the Cetacean and Turtle Assessment Program (CeTAP) surveys of the mid- and north Atlantic areas of the outer continental shelf (CeTAP 1982). Calving for the species occurs in low latitude waters outside of the area where the groundfish fishery operates. Blue whales feed on euphausiids (krill) that are too small to be captured in fishing gear. Given that the species is unlikely to occur in areas where the groundfish fishery operates, and given that the operation of the fishery would not affect the availability of blue whale prey or areas where calving and nursing of young occurs, the Proposed Action would not be likely to adversely affect blue whales.

Unlike blue whales, sperm whales do regularly occur in waters of the EEZ. However, the distribution of the sperm whales in the EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2006). In contrast, the multispecies fishery would operate in continental shelf waters. The average depth of sperm whale sightings observed during the CeTAP surveys was 1792 m (CeTAP 1982). Female sperm whales and young males almost always inhabit open ocean, deep water habitat with bottom depths greater than 1000 m and at latitudes less than 40° N (Whitehead 2002). Sperm whales feed on large squid and fish that inhabit the deeper ocean regions (Perrin et al. 2002). Given that sperm whales are unlikely to occur in areas (based on water depth) where the groundfish fishery would operate, and given that the operation of the fishery would not affect the availability of sperm whale prey or areas where calving and nursing of young occurs, the Proposed Action would not be likely to adversely affect sperm whales.

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

6.5.3 Interactions Between Gear and Protected Resources

Commercial fisheries are categorized by NMFS based on a two-tiered, stock-specific fishery classification system that addresses both the total impact of all fisheries on each marine mammal stock as well as the impact of individual fisheries on each stock. The system is based on the numbers of animals per year that incur incidental mortality or serious injury due to commercial fishing operations relative to a stock's Potential Biological Removal (PBR) level (the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population). Tier 1 takes into account the cumulative mortality and serious injury to marine mammals caused by commercial fisheries while Tier 2 considers marine mammal mortality caused by the individual fisheries; Tier 2 classifications are used in this EA to indicate how each type of gear proposed for use in the Proposed Action may affect marine mammals (NMFS 2009b). Table 27 identifies the classifications used in the List of Fisheries (LOF) proposed for FY 2010 (50 CFR 229), which are broken down into Tier 2 Categories I, II, and III).

Table 27 – Descriptions of the Tier 2 Fishery Classification Categories

Category	Category Description
Tier 2, Category I	A commercial fishery that has frequent incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is, by itself, responsible for the annual removal of 50 percent or more of any stock's potential biological removal (PBR) level.
Tier 2, 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.
Tier 2, 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 serous injury of marine mammals by a commercial fishery, the Assistant Administrator would determine whether the incidental serious injury or mortality is "remote" by evaluating other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, qualitative data from logbooks or fisher reports, stranding data, and the species and distribution of marine mammals in the area or at the discretion of the Assistant Administrator.

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

Although interactions between deployed gear and protected species would vary, interactions generally include becoming caught on hooks (longlines), entanglement in mesh (gillnets and trawls), entanglement in the float line (gillnets and trawls), entanglement in the groundline (gillnets, trawls, and longlines), entanglement in anchor lines (gillnets and longlines), or entanglement in the vertical lines that connect gear to the surface and surface systems (gillnets, trawls, and longlines). Entanglements are assumed to occur with increased frequency in areas where more gear is set and in areas with higher concentrations of protected species.

Table 28 lists the marine mammals known to have had interactions with sink gillnets, bottom trawls, and bottom longlines within the Gulf of Maine and Georges Bank, as excerpted from the proposed LOF for FY 2010 (also see Waring et al. 2009). Northeast sink gillnets have the greatest potential for interaction with protected resources, followed by bottom trawls. Impacts to protected resources through interaction with bottom longline gear are not known within the operations area; 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 28 – Marine Mammals Impacts Based on Groundfishing Gear and Northeast Multispecies Fishing Areas (Based on 2010 List of Fisheries)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	**Type**		
Tier 2, Category I	Mid-Atlantic gillnet	7,596	Bottlenose dolphin, western north Atlantic (WNA), coastal[a]
			Bottlenose dolphin, WNA, offshore
			Common dolphin, WNA
			Gray seal, WNA
			Harbor porpoise, Gulf of Maine(GOM)/Bay of Fundy(BOF)
			Harbor seal, WNA
			Harp seal, WNA
			Humpback whale, GOM
			Long-finned pilot whale, WNA
			Minke whale, Canadian east coast
			Short-finned pilot whale, WNA
			White-sided dolphin, WNA
Tier 2, Category I	Northeast sink gillnet	>6,455	Bottlenose dolphin, WNA, offshore
			Common dolphin, WNA
			Fin whale, WNA
			Gray seal, WNA
			Harbor porpoise, GOM/BOF [a]
			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		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	Type		
Tier 2, Category II	Mid-Atlantic bottom trawl	>1,000	Common dolphin, WNA [a] Long-finned pilot whale, WNA [a] Short-finned pilot whale, WNA [a] White-sided dolphin, WNA [a]
	Northeast bottom trawl	1,600	Common dolphin, WNA Gray seal, WNA[b] Harbor porpoise, GOM/BF 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]	>429	Fin whale, WNA [d] Humpback whale, GOM
Tier 2, Category III	Northeast/Mid-Atlantic bottom longline/hook-and-line	46	None documented in recent years

To minimize potential impacts to certain cetaceans, multispecies fishing vessels would be required to adhere to measures in the ALWTRP, which was developed to reduce the incidental take of large whales, specifically the right, humpback, fin, and minke whales in specific Category I or II commercial fishing efforts that utilize traps/pots and gillnets. The ALWTRP calls for the use of gear markings, area restrictions, and use of weak links, and neutrally buoyant groundline. Fishing vessels would be required to implement the ALWTRP in all areas where gillnets were used. In addition, the HPTRP would be implemented in the Gulf of Maine to reduce interactions between the harbor porpoise and gillnets; the HPTRP implements gear specifications, seasonal area closures, and in some cases, the use of pingers (acoustic devices that emit a loud sound) to deter harbor porpoises, and other marine mammals, from approaching the nets.

Although sea turtles have been caught and injured or killed in multiple types of fishing gear, including gillnets and hook and line fishing, mortalities from these gear types account for only about 50 percent of the mortalities associated with trawling gear (NMFS 2009c). 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). Sea turtles generally occur in more temperate waters than those in the Northeast multispecies area. Gillnets are considered more detrimental to marine mammals such as pilot whales, dolphins, porpoises, and seals, as well as large marine whales; however, protection for marine mammals would be provided through various Take Reduction Plans outlined above.

6.6 Human Communities/Social-Economic Environment

This EA considers changes to the multispecies FMP and evaluates the effect such changes 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. Although it is possible that social impacts would be solely experienced by individual fishery participants, it is more likely that impacts would be experienced across communities, gear cohorts, 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 fishery participants as well as their homeports.

6.6.1 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. The Northeast Multispecies FMP (large-mesh and small-mesh) includes a total of 13 large-mesh 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 Atlantic wolffish) harvested from three geographic areas (Gulf of Maine, Georges Bank, and Mid-Atlantic Bight/southern New England) representing twenty 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.

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. Foreign effort levels remained elevated until the passage of the Magnuson Fishery Conservation and Management Act in 1976. Early in this time period, landings of the principal groundfish (cod, haddock, pollock, hake, and redfish) peaked at about 650,000 tons. However, by the 1970's, landing decreased sharply to between 200,000 and 300,000 tons as the previously virgin GB stocks were exploited (NOAA 2007).

The exclusion of the foreign fishermen in 1976, coupled with technological advances 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 continued to trend downward from about 200,000 tons to about 100,000 tons through the mid 1980s (NOAA 2007).

In 1986, NEFMC implemented the Northeast Multispecies FMP with the goal of rebuilding stocks. From that time, 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, landing decreased throughout the latter part of the 1980s until reaching a more or less constant level of around 40,000 tons annually since the mid 1990's.

In 2004, the final rule implementing Amendment 13 to the FMP allowed for self-selected groups of limited access groundfish permit holders to form sectors. These sectors develop a legally binding operations plan and operate under an Annual Catch Entitlement (ACE) – a quota that limits catch. The 2004 rule also authorized implementation of the first sector, the Georges Bank Cod Hook Sector and in 2006 a second sector, the Georges Bank Cod Fixed Gear Sector, was authorized. While approved sectors are subject to general requirements specified in Amendment 16 in exchange for operating under an ACE, sector members are exempt from DAS and some of the other effort control measures that tended to limit the flexibility of fishermen.

Through Amendment 16, 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 announced 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 2009a).

In 2007, the Northeast multispecies fishery included 2,515 permits, about 1,500 of which are limited access, and about 690 active fishing vessels. 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 Georges Bank Cod Sectors. The remaining vessels were Common Pool groundfishing vessels.

There are over 100 communities that are homeport to one or more Northeast groundfishing vessels. These ports are distributed throughout the coastal northeast and in New Jersey. Vessels from these ports pursue stocks in three geographic regions: Gulf of Maine, Georges Bank, and southern New England. In 2007, the estimated dockside value of these groundfish landings was less than $60 million and represented approximately ½ of the total revenue received on trips where groundfish were landed.

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 an important alternative occupation in these port areas, tourism, is largely seasonal.

There is little hard socio-economic data upon which to evaluate the regional or 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. The perceived importance of these economic interrelationships is reflected by the creation of the Cape Cod regional competitiveness council, government recommendations that NEFMC begin compiling the data necessary to evaluate the importance of the fishery to the regional economy, and the inclusion of social and economic impact analysis in the NEFMC research priorities and data needs 2009-2013.

6.6.2 Multispecies Fleet Home Ports

Each of these ports is described below (in alphabetic order). The primary source of information for these descriptions is the Community Profiles for Northeast US Fisheries, by NEFSC (2009). Please refer to the source documents for a list of references as all of the in-text citations in this section are implied to be 'as cited in' NEFSC (2009).

6.6.2.1 Boston, Massachusetts

The City of Boston (42.35º N, 71.06º W) is the capital of Massachusetts, and is located in Suffolk County. Boston Harbor opens out onto Massachusetts Bay (USGS 2008). The city covers a total of 89.6 square miles, of which only 48.4 square miles (54 percent) is land.

6.6.2.1.1 History

The City of Boston has been an important port since its founding in 1630. Early on, it was the leading commercial center in the colonies (Banner 2005) and its economy was based on fishing, shipbuilding, and trade in and out of Boston Harbor. After the Revolutionary War, Boston became one of the wealthiest international ports in the world, exporting products such as rum, tobacco, fish, and salt (Lovestead 1997). Once an important manufacturing center, with many factories and mills based along Boston's numerous rivers and in the surrounding communities, many of the manufacturing jobs began to disappear around the early 1900s, as factories moved to the South. These industries were quickly replaced, however, by banking, financing, retail, and healthcare, and Boston later became a leader in high-tech industries (Banner 2005). The city remains the largest in New England and an important hub for shipping and commerce, as well as being an intellectual and educational hub. The Boston Fish Pier, located on the South Boston waterfront, has been housing fishermen for almost a century, and is the oldest continuously operating fish pier in the United States (BHA No Date) and home to the nation's oldest daily fish auction.

6.6.2.1.2 Commercial Fishing

More than 11,500 tons of fish are processed at the Fish Pier each year, of which 4,000 tons come from the 12 to 15 fishing vessels that dock there (BHA 2004). The landings show that large-mesh groundfish were the most valuable fishery in Boston, followed by monkfish and lobster (Table 29). While the value of landings in the multispecies fishery was less in 2006 than the 1997-2006 average, the value of both lobster and monkfish to Boston fishermen increased.

There are far more vessels with their homeport in Boston than there are vessel owners in Boston, indicating that most fishermen docked in Boston Harbor live elsewhere (Table 30). The landings values for both homeport and landed port varied over the period from 1997 to 2006, with no significant pattern. The landed port value exceeded the homeport value in every year, meaning some fishermen come from elsewhere to land their catch here.

Table 29 – Dollar value of Federally managed groups landed in Boston

Federal Group	Rank Value of Average Landings from 1997-2006[d]
Large-mesh Groundfish[a]	1
Monkfish	2
Lobster	3
Other[b]	4
Squid, Mackerel, Butterfish	5
Skate	6
Scallop	7
Herring	8
Summer Flounder, Scup, Black Sea Bass	9
Small-mesh Groundfish[c]	10
Bluefish	11
Dogfish	12
Tilefish	13

Notes:

[a]. Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.

[b] “Other” species includes any species not accounted for in a federally managed group.

[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).

[d] Only rank value is provided because value information is confidential in ports with fewer than three vessels or fewer than three dealers, or where one dealer predominates in a particular species and would therefore be identifiable.

Table 30 – Commercial Fishing Trends in Boston

Year	Number of vessels with Boston homeport	Number of vessels whose owner receives mail in Boston
1997	66	16
1998	49	10
1999	45	8
2000	37	10
2001	42	9
2002	45	9
2003	42	9
2004	43	9
2005	46	8
2006	46	7

6.6.2.2 Cundy's Harbor, Maine

The Village of Cundy's Harbor (44.40º N, 69.89º W) is located on Casco Bay within the town of Harpswell, in Cumberland County, Maine. The town of Harpswell is made up of a 10-mile peninsula extending into Casco Bay. It also includes three large islands, Bailey Island, Orr Island, and Great (Sebascodegan) Island, and over 200 small islands, creating over 216 miles of coastline for the town (TPL 2007). Cundy's Harbor is located on the tip of Great Island (USGS 2008).

6.6.2.2.1 History

The town of Harpswell is geographically spread out, and is divided into five main villages: Cundy's Harbor, Harpswell, South Harpswell, Bailey Island, and Orr's Island. Cundy's Harbor is the oldest lobstering community in Maine (TPL 2007). Harpswell was incorporated as a town in 1758, under what was then the Massachusetts Bay Colony. Many tall ships, sloops, and schooners were built here during the 1800s, and fishing has been an important economic activity for the town for centuries. Today the town is often considered to have three populations: commuters, who reside here but work in Portland, Bath, or Brunswick; retirees who have moved to Harpswell; and "working townsfolk," many of whom earn their income from fishing (Hall-Arber et al. 2001).

6.6.2.2.2 Commercial Fishing

There are multiple commercial wharves here including Cundy's Harbor, Holbrook's, Hawkes, Mill's Ledge Seafood, Watson's, and Oakhurst Island. Overall, lobster dominates the landings in Cundy's Harbor, worth more than $2.5 million in 2006 (Table 31). Landings in the "Other" species grouping were also significant, with the 10-year average greater than the 2006 value. The level of landings in Cundy's Harbor overall varied during this time period between about $1.5 million and over $3.4 million, with no discernible pattern (Table 32). The level of homeport fishing for Cundy's Harbor was consistently lower than the level of landings here overall, indicating that fishermen from other harbors land their catch there. The level of fishing for homeported values was also variable. The number of homeported vessels in Cundy's Harbor showed somewhat of a declining trend from 1997 to 2006, while the number of vessels with owners living in Cundy's Harbor declined sharply, from 11 in 1997 to three in 2006.

Table 31 – Commercial Fishing Trends in Cundy's Harbor

Year	Number of vessels with Cundy's Harbor homeport	Number of vessels whose owner receives mail in Cundy's Harbor	Value of landings among vessels homeported in Cundy's Harbor[a]	Value of fisheries landed in Cundy's Harbor[a]
1997	28	11	$2,053,625	$2,595,709
1998	21	7	$1,611,016	$1,577,290
1999	21	6	$1,343,196	$3,248,354
2000	17	3	$1,361,446	$3,329,120
2001	20	2	$1,371,412	$2,636,583
2002	25	2	$2,029,047	$1,797,178
2003	21	1	$1,849,415	$2,191,411
2004	19	2	$1,676,130	$3,230,312
2005	19	2	$2,573,070	$3,479,115
2006	20	3	$2,708,258	$3,206,997

Note:
[a] All values are reported in nominal U.S. dollars.

Table 32 – Dollar Value of Federally Managed Groups Landed in Cundy's Harbor

Federal Group	Average from 1997-2006[d]	2006 only[d]
Lobster	$2,088,171	$2,512,267
Other[a]	$500,190	$385,155
Large-mesh Groundfish[b]	$109,930	$285,239
Monkfish	$26,098	$17,655
Herring	$3,671	$0
Dogfish	$667	$6,667
Scallop	$380	$0
Skate	$106	$0
Small-mesh Groundfish[c]	$12	$0
Squid, Mackerel, Butterfish	$1	CONFIDENTIAL

Notes:
[a]. "Other" species includes any species not accounted for in a federally managed group.
[b] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.
[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).
[d] All values are reported in nominal U.S. dollars.

6.6.2.3 Gloucester, Massachusetts

The City of Gloucester (42.62°N, 70.66°W) is located on Cape Ann, along the northern coast of Massachusetts in Essex County. It is 30 miles northeast of Boston and 16 miles northeast of Salem. The area encompasses 41.5 square miles of territory, of which 26 square miles is land (USGS 2008).

6.6.2.3.1 History

The history of Gloucester has revolved around the fishing and seafood industries since its settlement in 1623. By the mid 1800s, Gloucester was regarded by many to be the largest fishing port in the world. The construction of memorial statues and an annual memorial to fishermen demonstrates that the historic death tolls in commercial fisheries are still in the memory of the town's residents. The town is well-known as the home of Gorton's frozen fish packaging company, the nation's largest frozen seafood company. As in many communities, after the U.S. passed the Magnuson Fishery Conservation and Management Act of 1976 and foreign vessels were prevented from fishing within the EEZ, Gloucester's fishing fleet soon increased -- only to decline with the onset of major declines in fish stocks and subsequent strict catch regulations. For more detailed information regarding Gloucester's history, see Hall-Arber et al. (2001).

6.6.2.3.2 Commercial Fishing

Although there are threats to the future of Gloucester's fishery, the fishing industry remains strong in terms of recently reported landings. Gloucester's commercial fishing industry had the 13th highest landings in the U.S. (over 39,000 tons) and the nation's ninth highest landing value in 2002 ($41.2 million). Gloucester's federally managed group with the highest landed value was large-mesh groundfish worth nearly $20 million in 2006 (Table 33). Lobster landings were second in value, bringing in more than $10 million in 2006, a significant increase from the 1997-2006 average value of just over $7 million. Monkfish and herring were also valuable species; both had more valuable landings in 2006 than the 10-year average value. The number of vessels homeported (federal) decreased slightly from 1997 to 2006 (Table 34).

Table 33 – Dollar value of Federally managed groups landed in Gloucester

Federal Group	Average from 1997-2006[d]	2006 only[d]
Large-mesh Groundfish[a]	$17,068,934	$19,577,975
Lobster	$7,036,231	$10,179,221
Monkfish	$3,556,840	$4,343,644
Other[b]	$3,246,920	$1,906,551
Herring	$3,127,523	$5,623,383
Squid, Mackerel, Butterfish	$1,065,567	$3,692,506
Scallop	$735,708	$1,113,749
Small-mesh Groundfish[c]	$732,353	$254,287
Dogfish	$375,972	$316,913
Skate	$63,488	$27,334
Tilefish	$52,502	$245,398
Surf Clams, Ocean Quahog	$29,033	$77,805
Bluefish	$21,672	$18,116
Summer Flounder, Scup, Black Sea Bass	$1,286	$603

Notes:

[a] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.

[b] "Other" species includes any species not accounted for in a federally managed group.

[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).

[d] All values are reported in nominal U.S. dollars.

Table 34 – Commercial Fishing Trends in Gloucester

Year	Number of vessels with Gloucester homeport	Number of vessels whose owner receives mail in Gloucester	Value of landings among vessels homeported in Gloucester [a]	Value of fisheries landed in Gloucester[a]
1997	123	49	$14,260,267	$43,219,804
1998	104	43	$11,898,155	$35,203,041
1999	116	47	$14,781,969	$42,393,247
2000	115	43	$16,486,230	$45,434,740
2001	109	39	$15,488,517	$34,356,660
2002	107	40	$15,208,020	$40,396,946
2003	114	40	$15,478,904	$28,892,963
2004	111	38	$17,763,527	$34,690,050
2005	111	43	$18,051,059	$34,613,266
2006	104	44	$13,255,702	$27,825,058

Note:

[a] All values are reported in nominal U.S. dollars.

6.6.2.4 New Bedford, Massachusetts

New Bedford is the fourth largest city in Massachusetts. It is situated on Buzzards Bay, located in the southeastern section of the state in Bristol County. The city is 54 miles south of Boston (State of Massachusetts 2006), and has a total area of 24 square miles, of which about 4 square miles (16.2 percent) is water (USGS 2008).

6.6.2.4.1 History

Settled in 1652, a New Bedford fishing community was established in 1760. The port focused largely on whaling until the discovery of petroleum decreased the demand for sperm oil in the mid- to late 1800's. At that time, New Bedford began to diversify its economy, by expanding the focus of the fishing fleet, and focusing on the manufacture of textiles until the southeast cotton boom in the 1920s.

Since then, New Bedford has continued to diversify, but the city is still a major commercial fishing port (USGenNet 2006) consistently ranked among the top two ports in the U.S. for landed value. One factor complicating further development of the New Bedford harbor area is its listing by U.S. EPA as a superfund site due to the presence of metals, organic compounds, and PCBs.

6.6.2.4.2 Commercial Fishing

The number of commercial fishing vessels homeported in New Bedford increased from 244 in 1997 to 273 in 2006 as fishermen moved to New Bedford to take advantage of commercial fishing infrastructure. Concurrent with this increase in homeported vessels, the value of fishing for homeport vessels more than doubled from $80 million to $184 million from 1997 to 2006 and the value of New Bedford landings increased to $281 million (Table 35). However, over that same time the value of groundfish landings decreased approximately 20 percent (Table 36).

Table 35 – Commercial Fishing Trends in New Bedford

Year	Number of vessels with New Bedford homeport	Number of vessels whose owner receives mail in New Bedford	Value of landings among vessels homeported in New Bedford[a]	Value of fisheries landed in New Bedford[a]
1997	244	162	$80,472,279	$103,723,261
1998	213	137	$74,686,581	$94,880,103
1999	204	140	$89,092,544	$129,880,525
2000	211	148	$101,633,975	$148,806,074
2001	226	153	$111,508,249	$151,382,187
2002	237	164	$120,426,514	$168,612,006
2003	245	181	$129,670,762	$176,200,566
2004	257	185	$159,815,443	$206,273,974
2005	271	195	$200,399,633	$282,510,202
2006	273	199	$184,415,796	$281,326,486

Note:
[a] All values are reported in nominal U.S. dollars.

Table 36 – Dollar value of Federally managed groups landed in New Bedford

Federal Group	Average from 1997-2006[d]	2006 only[d]
Scallop	$108,387,505	$216,937,686
Large-mesh Groundfish[a]	$30,921,996	$23,978,055
Monkfish	$10,202,039	$8,180,015
Surf Clams, Ocean Quahog	$7,990,366	$9,855,093
Lobster	$4,682,873	$5,872,100
Other[b]	$4,200,323	$2,270,579
Skate	$2,054,062	$3,554,808
Squid, Mackerel, Butterfish	$1,916,647	$5,084,463
Summer Flounder, Scup, Black Sea Bass	$1,481,161	$2,227,973
Small-mesh Groundfish[c]	$897,392	$1,302,488
Herring	$767,283	$2,037,784
Dogfish	$89,071	$13,607
Bluefish	$25,828	$10,751
Tilefish	$2,675	$1,084

Notes:
[a] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.
[b] “Other” species includes any species not accounted for in a federally managed group.
[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).
[d] All values are reported in nominal U.S. dollars.

In addition to the commercial fleet, New Bedford has approximately 44 fish wholesale companies, 75 seafood processors, and about 200 shore-side industries (Hall-Arber 2001). This core seafood industry supports 2,600 local jobs, which represents 45 percent of employment in the seafood harvesting sector in Massachusetts (State of Massachusetts 2002).

6.6.2.5 Newport, Rhode Island

Newport, Rhode Island (41.50°N, 71.30°W) is located at the southern end of Aquidneck Island in Newport County (USGS 2008). The city is located 60 miles from Boston, Massachusetts, and about 187 miles from New York City.

6.6.2.5.1 History

English settlers founded Newport in 1639 (City of Newport No Date). Although Newport’s port is now mostly dedicated to tourism and recreational boating, it has had a long commercial fishing presence. In the mid 1700s, Newport was one of the five largest ports in colonial North America. Until Point Judith’s docking facilities were developed, Newport was the center for fishing and shipping in Rhode Island (Hall-Arber et al. 2001; RIEDC 2008).

Between 1800 and 1930, the bay and inshore fleet dominated the fishing industry of Newport. Menhaden was the most important fishery in Newport and all of Rhode Island until the 1930s when the fishery collapsed. At this time, the fishing industry shifted to groundfish trawling. The use of the diesel engine, beginning in the 1920s, facilitated fishing farther from shore than was done in prior years (Hall-Arber et al. 2001).

6.6.2.5.2 Commercial Fishing

Of the federal landed species, scallop had the highest value in 2006, at over $13 million. The average value of scallop landings for 1997-2006 was just over $2.5 million; 2006 landings represent a more than five-fold increase over this average value. Lobster was the most valuable species, worth more than $2.7 million on average, and close to $3 million in 2006. The squid, mackerel, and butterfish grouping, large-mesh groundfish, and monkfish were all valuable fisheries in Newport (Table 37). The value of landings for homeported vessels in Newport was relatively consistent from 1997-2006, with a high of just under $8 million in 2003 (Table 38). The level of landings in Newport was steady from 1997-2004, and then saw enormous increases in 2005 and 2006, to almost $21 million in 2006. Homeported vessels in Newport declined from a high of 59 in 2000 to 48 in 2006. The number of vessels with owners living in Newport increased from 13 in 1997 to 18 in 2006 indicating that most vessels homeported in Newport have owners residing in other communities.

Table 37 - Dollar value of Federally managed groups landed in Newport

Federal Group	Average from 1997-2006[d]	2006 only[d]
Lobster	$2,578,908	$2,971,680
Scallop	$2,528,448	$13,267,494
Squid, Mackerel, Butterfish	$1,425,947	$1,315,229
Large-mesh Groundfish[a]	$1,039,962	$445,273
Monkfish	$878,265	$1,068,547
Summer Flounder, Scup, Black Sea Bass	$739,880	$815,918
Other[b]	$334,103	$401,779
Small-mesh Groundfish[c]	$179,296	$43,165
Skate	$58,481	$224,184
Herring	$42,538	$267,164
Dogfish	$26,441	$6,037
Red Crab	$15,560	$0
Bluefish	$11,759	$9,878
Tilefish	$9,230	$1,213

Notes:

[a] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.

[b] “Other” species includes any species not accounted for in a federally managed group.

[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).

[d] All values are reported in nominal U.S. dollars.

Table 38 - Commercial Fishing Trends in Newport

Year	Number of vessels with Newport homeport	Number of vessels whose owner receives mail in Newport	Value of landings among vessels homeported in Newport [a]	Value of fisheries landed in Newport [a]
1997	52	13	$5,130,647	$7,598,103
1998	52	16	$6,123,619	$8,196,648
1999	52	14	$6,313,350	$8,740,253
2000	59	14	$6,351,986	$8,296,017
2001	52	15	$5,813,509	$7,485,584
2002	55	17	$6,683,412	$7,567,366
2003	52	16	$7,859,848	$9,082,560
2004	52	15	$5,951,228	$8,402,556
2005	54	17	$6,012,472	$14,281,505
2006	48	18	$6,811,060	$20,837,561

Note:
[a] All values are reported in nominal U.S. dollars.

6.6.2.6 Portland Harbor, Maine

The city of Portland, Maine (43.66 N, 70.2 W) has 56.9 miles of coastline (Sheehan and Copperthwaite 2002), a terrestrial area of 54.9 square miles, and 31.4 square miles of water. It is located in Cumberland County on Casco Bay, and is adjacent to South Portland, Westbrook, and Falmouth. Portsmouth and Manchester, New Hampshire are the closest large cities (MapQuest 2006). Portland is the largest city in Maine and has the highest population in New England north of Boston.

6.6.2.6.1 History

The city's port industries have driven its economy since its settlement. From the mid-1800s until World War I, Portland provided the only port for Montreal, Canada. Railroads from the south to the north fed through the city, facilitating trade and travel. Although Canada developed its own ports, and other cities in southern New England states built larger ports, the city remained tied to its maritime roots by depending on the fishing industry. More recently, it has become a popular cruise ship destination. Although tourism plays a major role in the city's economy, Portland functions as the second largest oil port on the east coast of the U.S., and as valuable fishing port (Monroe No Date). For a more detailed history of Portland and the surrounding fishing communities, refer to Hall Arber et al. (2001).

6.6.2.6.2 Commercial Fishing

Portland's landings come primarily from the large-mesh groundfish species and from lobster, with over $14 million and $12 million respectively over the 10-year average (Table 39). Monkfish and herring are also important species. There was also a variety of other species landed in Portland between the years 1997-2006. Both the number of vessels homeported and number of vessels registered with owner's living in Portland slightly decreased between 1997 and 2006. The level of fishing homeport value increased until 2006, where there was a drop from over $18 million in the previous year to about $13 million. The level of fishing landed experienced a similar trend, with a dip from 2005 to 2006 of over $6 million (Table 40).

Table 39 - Dollar value of Federally managed groups landed in Portland Harbor

Federal Group	Average from 1997-2006[d]	2006 only[d]
Large-mesh Groundfish[a]	$14,433,950	$10,756,311
Lobster	$12,616,286	$8,737,373
Monkfish	$4,908,022	$3,094,679
Herring	$2,524,047	$4,423,437
Other[b]	$2,007,356	$684,362
Scallop	$65,950	$72,250
Small-mesh Groundfish[c]	$44,811	$168
Skate	$44,582	$933
Squid, Mackerel, Butterfish	$17,444	CONFIDENTIAL
Tilefish	$15,623	CONFIDENTIAL
Summer Flounder, Scup, Black Sea Bass	$12,334	CONFIDENTIAL
Dogfish	$12,023	$12,211
Bluefish	$151	$73

Notes:

[a]. "Other" species includes any species not accounted for in a federally managed group.

[b] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.

[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).

[d] All values are reported in nominal U.S. dollars.

Table 40 - Commercial Fishing Trends in Portland

Year	Number of vessels with Portland homeport	Number of vessels whose owner receives mail in Portland	Value of landings among vessels homeported in Portland [a]	Value of fisheries landed in Portland [a]
1997	123	49	$14,260,267	$43,219,804
1998	104	43	$11,898,155	$35,203,041
1999	116	47	$14,781,969	$42,393,247
2000	115	43	$16,486,230	$45,434,740
2001	109	39	$15,488,517	$34,356,660
2002	107	40	$15,208,020	$40,396,946
2003	114	40	$15,478,904	$28,892,963
2004	111	38	$17,763,527	$34,690,050
2005	111	43	$18,051,059	$34,613,266
2006	104	44	$13,255,702	$27,825,058

Note:
[a] All values are reported in nominal U.S. dollars.

6.6.2.7 Portsmouth, New Hampshire

Portsmouth (43.03° N, 70.47°W) (USGS 2008) is located in Rockingham County, New Hampshire. Portsmouth Harbor is located by the mouth of the Piscataqua River, which allows deep water access (State of New Hampshire DHR 2006). Portsmouth is located along the State's seaboard that only totals about 18 miles.

6.6.2.7.1 History

The City of Portsmouth is the second oldest city in New Hampshire. It was originally settled in 1623 as Strawberry Banke and was incorporated as Portsmouth in 1631. Fishing, farming, shipbuilding, and coastal trade were the major industries throughout New Hampshire in the 1600s. By 1725, Portsmouth was a thriving commercial port, exporting timber products and importing a wide range of goods (Wallace 2006). However, the 1800s brought change to Portsmouth as the seacoast declined as a commercial center. Many nearby towns, like Dover, Newmarket, and Somersworth, turned to textile manufacturing (Wallace 2006). The Portsmouth Naval Shipyard, established in June 1800, is the oldest naval shipyard continuously operated by the United States Government (PNS No Date). In recent times, high-tech industries and an increase in tourism has transformed Portsmouth and all of southern New Hampshire, making New Hampshire into the fastest growing state in the Northeast (State of New Hampshire DHR 2006).

6.6.2.7.2 Commercial Fishing

Large-mesh groundfish and monkfish were the most valuable landings in Portsmouth between the years 1997 and 2006 (Table 41). Additionally, lobster, "other" species, and sea scallops accounted for a large portion of the value of species landed in Portsmouth. The value of landings of most of these species groupings had declined in 2006 from the 1997-2006 average; lobster landings had increased considerably, however, and were the most valuable landings for Portsmouth in 2006.

The number of homeported vessels has varied between the years 1997 and 2006, but overall showed an increasing trend. In 1997, there were 54 vessels which increased to a high of 67 vessels in 2004. The number of vessels where the owner's city is Portsmouth varies slightly over the years with no consistent trend (Table 42).

Table 41 - Dollar value of Federally managed groups landed in Portsmouth

Federal Group	Rank Value of Average Landings from 1997-2006[d]
Large-mesh Groundfish[a]	1
Monkfish	2
Lobster	3
Other[b]	4
Scallop	5
Dogfish	6
Herring	7
Small-mesh Groundfish[c]	8
Skate	9
Bluefish	10
Squid, Mackerel, Butterfish	11
Summer Flounder, Scup, Black Sea Bass	12
Tilefish	13

Notes:

[a] Large-mesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock.

[b] "Other" species includes any species not accounted for in a federally managed group

[c] Small-mesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting).

[d] Only rank value is provided because value information is confidential in ports with fewer than three vessels or fewer than three dealers, or where one dealer predominates in a particular species and would therefore be identifiable.

Table 42 – Commercial Fishing Trends in Portsmouth

Year	Number of vessels with Portsmouth homeport	Number of vessels whose owner receives mail in Portsmouth
1997	54	26
1998	44	20
1999	45	18
2000	62	21
2001	63	22
2002	59	25
2003	54	21
2004	67	29
2005	64	20
2006	66	19

6.6.3 Economic Status of Commercial Groundfish Harvesting Sector

6.6.3.1 DAS Allocation and Use

The number of Category A DAS allocated to the multispecies fleet generally declined in FY 2004 – 2008. Just over 50,000 days were allocated in 2005, and slightly less than 44,000 were allocated in 2008. DAS allocated to vessels that called in decreased by an even greater amount – from over 37,000 in 2005 to under 26,000 in 2008. The number of permitted vessels in the time span decreased by 120 (from 1,320 to 1,200), and the number of vessels that called in decreased by an even greater amount (from 685 to 512). Despite fewer DAS allocated and fewer boats fishing, the number of DAS used remained relatively constant in FY 2005 – 2008. In those years, the fewest days (30,847) were used in 2008, and the largest number of days (32,804) was used in 2007 (Table 43). These values reflect the DAS charged and do not take into account differential DAS counting (adopted in FY 2006). As a result, the number of DAS charged in FY 2006 does not bear the same relationship to time underway as the number charged in earlier years. The actual DAS underway on Category A DAS for FY 2006 – FY 2008 was about 25,000 (FY 2006), 25,314 in FY 2007, and 25,529 in FY 2008.

Table 43 – Multispecies Limited Access A Days-at-Sea Used by Multispecies Permit Category, FY 2005-2008

Categories		Total Number of Permitted Vessels	Total Days-at-Sea Allocated	Number of Permitted Vessels that Called In	DAS Allocated to Vessels that Called In	DAS Allocated and Net Leased to Vessels that Called In	Total DAS Used
2005	Individual	1,128	45,969	619	34,529	41,022	29,898
	Combination	46	649	11	472	485	423
	Hook Gear	94	1,682	31	1,119	1,105	387
	Large Mesh	44	1,680	24	1,127	1,540	1,064
	Small Vessel Exemption	8	38	0	0	0	0
	Total	**1,320**	**50,018**	**685**	**37,247**	**44,152**	**31,773**
2006	Individual	1,107	46,240	568	31,184	40,137	30,072
	Combination	47	439	3	189	169	157
	Hook Gear	82	2,413	22	1,472	1,479	337
	Large Mesh	41	1,692	32	1,261	1,631	1,229
	Small Vessel Exemption	7	37	0	0	0	0
	Total	**1,284**	**50,820**	**625**	**34,106**	**43,416**	**31,794**
2007	Individual	1,099	45,835	524	28,721	40,637	31,595
	Combination	47	415	5	204	296	234
	Hook Gear	79	2,287	19	1,277	1,265	270
	Large Mesh	33	1,034	25	956	990	693
	Small Vessel Exemption	13	138	1	12	12	12
	Total	**1,271**	**49,710**	**574**	**31,170**	**43,200**	**32,804**
2008	Individual	1,037	41,258	474	24,369	36,102	29,354
	Combination	46	517	5	219	393	369
	Hook Gear	74	1,216	9	435	393	115
	Large Mesh	31	883	23	769	842	963
	Small Vessel Exemption	12	97	1	12	12	46
	Total	**1,200**	**43,971**	**512**	**25,805**	**37,743**	**30,847**

These data include multispecies/monkfish DAS trips (in which the multispecies and monkfish clocks run concurrently).
Permits are limited access multispecies permits that were active on the last day of the fishing year.
DAS Allocated is multispecies A DAS net allocation after including base and carry over, NOT leased.
Source: Permits Database and AMS Database

6.6.3.2 Landings and Revenues

The commercial harvesting sector may be described as a function of its multiple components, including gear types, vessels, and communities. In this section, activity in the commercial sector is characterized in terms of **permit category**, **vessel length class**, **homeport state, and port group**. Because of the way in which the data is queried for each of these descriptive approaches, total numbers of vessels, landings and revenues may differ slightly among the four sections. In some cases information cannot be reported due to data confidentiality provisions. Where such anomalies occur, we have attempted to provide a clear explanation. Revenue is reported as gross revenue and does not take into account the changes in fixed and operating costs over time (net revenue).

Landings and revenues by fishing year were summarized in Amendment 13, FW 40A, FW 40B, FW 41, FW 42, and Amendment 16. This section updates this information for FY 2004 through

2008. Minor differences exist between the information previously reported and this section due to updates to the databases and revisions to data queries (including the addition of Atlantic wolffish to the management unit). Most notably, nominal and constant groundfish revenues were incorrectly reported in Amendment 16 in Table 57 (NEFMC 2009) due to a data error; other tables were correct. The data are also reported in different categories than in previous reports in order to capture changes in permit categories and changes in landings and revenues in communities.

Regulated groundfish (cod, haddock, yellowtail flounder, winter flounder, witch flounder, windowpane flounder, plaice (dabs), pollock, redfish, Atlantic halibut, white hake, red/white hake mixed, and Atlantic wolffish) and ocean pout landings and revenues are summarized in **Error! Reference source not found.**. This table includes all landings reported to the NMFS dealer database system, regardless of whether the landings can be attributed to a multispecies permit. It includes aggregate landings reported by states and landings that cannot be attributed to a permit as well as landings by vessels that did not possess a federal multispecies permit (i.e. landings from state registered vessels fishing in state waters). Regulated groundfish landings declined from 80 million pounds in FY 2004 to 50 million pounds (landed weight) in FY 2006, or 37 percent, before increasing to 68 million pounds in FY 2008. Nominal revenues decreased 9 percent from FY 2004 ($84.6 million) to FY 2006 ($76.9 million) and then rebounded to $85 million in FY 2008. Revenues in constant 1999 dollars declined 13 percent, from $73.9 million in FY 2004 to $64.3 million in FY 2008. The average price, in both nominal and constant dollar terms, peaked in FY 2006, the year with the lowest landed weight. By FY 2008, in terms of constant dollars the price declined to less than a dollar per pound. The sections following this table summarize landings and revenues for groundfish permit holders only.

Table 44 – Total groundfish landings and revenues, FY 2004 – FY 2008

	Fishing Year				
Data	**2004**	**2005**	**2006**	**2007**	**2008**
Groundfish, landed weight	79,833,841	65,707,988	50,095,191	60,781,989	68,112,481
Groundfish, live weight	87,280,257	72,063,086	54,979,680	67,437,099	75,790,377
Nominal Dollars	$84,633,488	$85,210,805	$76,893,026	$84,596,827	$85,023,624
1999 Dollars	$73,980,543	$74,026,292	$64,951,294	$67,027,790	$64,330,117
Average Price (nominal)	$1.06	$1.30	$1.53	$1.39	$1.25
Average Price (constant)	$0.93	$1.13	$1.30	$1.10	$0.94

6.6.3.2.1 Landings and Revenues by Groundfish Permit Category

As mentioned earlier, the information in the following sections is reported for groundfish permits only. Total landings by groundfish permits declined from 509.9 million pounds in FY 2004 to 436 million pounds in FY 2006 before rebounding to 460.6 million pounds in FY 2008, a decline of 9.7 percent from FY 2004. For individual DAS permits, total landings declined from 244.9 million pounds in FY 2004 to 194.6 million pounds in FY 2007 before increasing to 210.6 million pounds in FY 2008, a decline of 14.1 percent from FY 2004. Revenue changes were similar; from FY 2004 to FY 2008 revenues (constant 1999 dollars) declined 7 percent for all permits and 12.5 percent for individual DAS permits (Table 45 and

Table 46).

Groundfish landings by permitted vessels declined from 77.3 million pounds in FY 2004 to 48.4 million pounds in FY 2006 (-37 percent), then increased to 64.5 million pounds in FY 2008 (-14%). Groundfish revenues did not show as large an initial reduction, declining from $71.3 million in FY 2004 to $62.5 million in FY 2006, a decline of 12 percent. In spite of the increase in landed weight from FY 2006 to FY 2008 revenues actually declined slightly to $62.3 million, or 13 percent less than FY 2004. Individual DAS permits did slightly better, with FY 2004 revenues of $66.9 million declining 9 percent to $60.5 million in FY 2006, and declining again to $59.5 million in FY 2008, 11 percent less than in FY 2004 (Table 47 and Table 48).

When comparing total revenues and groundfish revenues for individual DAS permit holders it is clear that groundfish is only a portion of the revenue generated by these fishing businesses. In all years, groundfish revenues were 37 to 42 percent of the revenues generated by groundfish permits. In recent years about half the individual DAS permits earn less than 25 percent of their revenues from groundfish. These revenues can be earned on groundfish trips or on trips in other fisheries. During this period there are 1,071 individual DAS permits with a landings record of any species in the dealer database. The percentage of these permits with no groundfish revenues increased from 22 percent in FY 2004 to 30 percent in FY 2008, even as the total number of permits landing groundfish also declined. The percentage earning 75 percent or more of their revenues from groundfish has remained fairly constant at between 20 and 25 percent (Table 49), but the number has declined. Because of the importance of other revenues, total revenues are also examined for this fishery.

The contribution of different species to landings and revenues are illustrated in Figure 8 and Figure 9. In terms of landed weight, cod, haddock and pollock were major components of the fishery throughout the time period. Yellowtail flounder was a major component in FY 2004 and 2005, but increasingly restrictive TACs for GB yellowtail flounder have reduced the contribution of that species to landings. Cod is the most valuable species in terms of nominal revenue, with pollock and haddock the other key components. Yellowtail, winter, and witch flounder contribute similar proportions to revenues.

Table 45 – Total landings by groundfish permit category, FY 2004 – FY 2008

CAT	2004	2005	2006	2007	2008
Individual DAS	244,869,377	203,659,914	195,144,787	194,633,706	210,610,508
Fleet DAS	605,481				
Small Vessel Exemption	Conf.	Conf.	Conf.	119,178	157,423
Hook Gear	2,134,466	1,694,986	1,218,495	1,009,899	1,077,388
Combination Vessel	14,452,283	10,888,403	10,970,697	9,360,710	10,347,834
Large Mesh Individual DAS	7,105,788	4,910,866	4,338,460	4,307,712	4,349,382
Large Mesh Fleet DAS	150,183				
Handgear A	1,637,728	30,178,130	18,763,373	7,554,424	6,418,611
Handgear B	129,282,110	153,016,712	113,799,842	126,772,588	129,167,606
Other Open Access	109,709,282	98,185,684	92,146,876	97,217,711	98,436,873
Grand Total	509,946,698	502,534,695	436,382,530	440,975,928	460,565,625

Table 46 – Total revenues (constant 1999 dollars) by groundfish permit category, FY 2004 – FY 2008

Category	2004	2005	2006	2007	2008
Individual DAS	$161,467,018	$180,707,691	$161,258,141	$147,249,497	$141,397,879
Fleet DAS	$598,602				
Small Vessel Exemption	Conf.	Conf.	Conf.	$146,880	$261,457
Hook Gear	$3,335,824	$3,743,698	$3,648,543	$2,835,928	$2,342,620
Combination Vessel	$40,517,445	$48,260,800	$44,677,387	$38,921,702	$35,564,476
Large Mesh Individual DAS	$6,459,728	$6,710,455	$4,860,237	$3,789,944	$4,378,467
Large Mesh Fleet DAS	$107,855				
Handgear A	$1,401,010	$5,078,144	$4,069,096	$3,008,347	$2,582,939
Handgear B	$38,259,487	$57,326,175	$55,521,251	$55,642,744	$52,663,840
Other Open Access	$241,955,823	$281,705,097	$254,821,291	$255,819,899	$218,987,039
Grand Total	$494,102,792	$583,532,060	$528,855,946	$507,414,941	$458,178,718

Table 47 – Groundfish landings (lbs. landed weight) by groundfish permit category

Category	2004	2005	2006	2007	2008
Individual DAS	72,715,253	62,067,822	46,802,829	57,662,703	64,524,562
Fleet DAS	95,484				
Small Vessel Exemption	Conf.	Conf.	Conf.	1,848	2,592
Hook Gear	631,805	544,607	205,806	192,718	195,082
Combination Vessel	1,894,704	846,338	397,448	558,376	1,180,765
Large Mesh Individual DAS	1,515,292	671,286	590,093	163,378	317,851
Large Mesh Fleet DAS	9,621				
Handgear A	248,024	30,955	122,378	79,083	100,167
Handgear B	68,475	47,647	54,995	150,517	84,528
Other Open Access	101,875	58,480	212,711	115,814	78,313
Grand Total	77,280,533	64,267,135	48,386,260	58,924,437	66,483,860

Table 48 – Groundfish revenues (constant 1999 dollars) by groundfish permit category

Category	2004	2005	2006	2007	2008
Individual DAS	$66,868,777	$69,188,498	$60,526,167	$62,728,288	$59,488,516
Fleet DAS	$61,184				
Small Vessel Exemption	Conf.	Conf.	Conf.	$2,976	$3,389
Hook Gear	$828,724	$875,657	$383,944	$336,908	$253,003
Combination Vessel	$1,763,554	$1,195,786	$535,598	$727,519	$1,075,572
Large Mesh Individual DAS	$1,382,159	$759,700	$554,015	$202,134	$1,145,087
Large Mesh Fleet DAS	$10,874				
Handgear A	$183,214	$47,329	$117,613	$108,815	$124,544
Handgear B	$90,048	$75,338	$78,602	$207,849	$124,239
Other Open Access	$111,505	$83,056	$321,082	$169,123	$88,261
Grand Total	$71,300,039	$72,225,364	$62,517,020	$64,483,613	$62,302,610

Table 49 – Groundfish as a percent of total revenues, FY 2004 - FY 2008 for Individual DAS permits only

Max %	2004		2005		2006		2007		2008	
	Freq.	*Cum. %*	*Freq.*	*Cum. %*	*Freq.*	*Cum. %*	*Freq.*	*Cum. %*	*Freq.*	*Cum. %*
0	190	21.57%	213	25.15%	225	27.51%	243	31.40%	217	30.06%
25%	204	44.72%	215	50.53%	193	51.10%	141	49.61%	165	52.91%
50%	120	58.34%	89	61.04%	113	64.91%	108	63.57%	61	61.36%
75%	152	75.60%	159	79.81%	138	81.78%	119	78.94%	105	75.90%
100%	215	100.00%	171	100.00%	149	100.00%	163	100.00%	174	100.00%
Total	881		847		818		774		722	

Figure 8 – Multispecies landings by species, FY 2004 – FY 2008

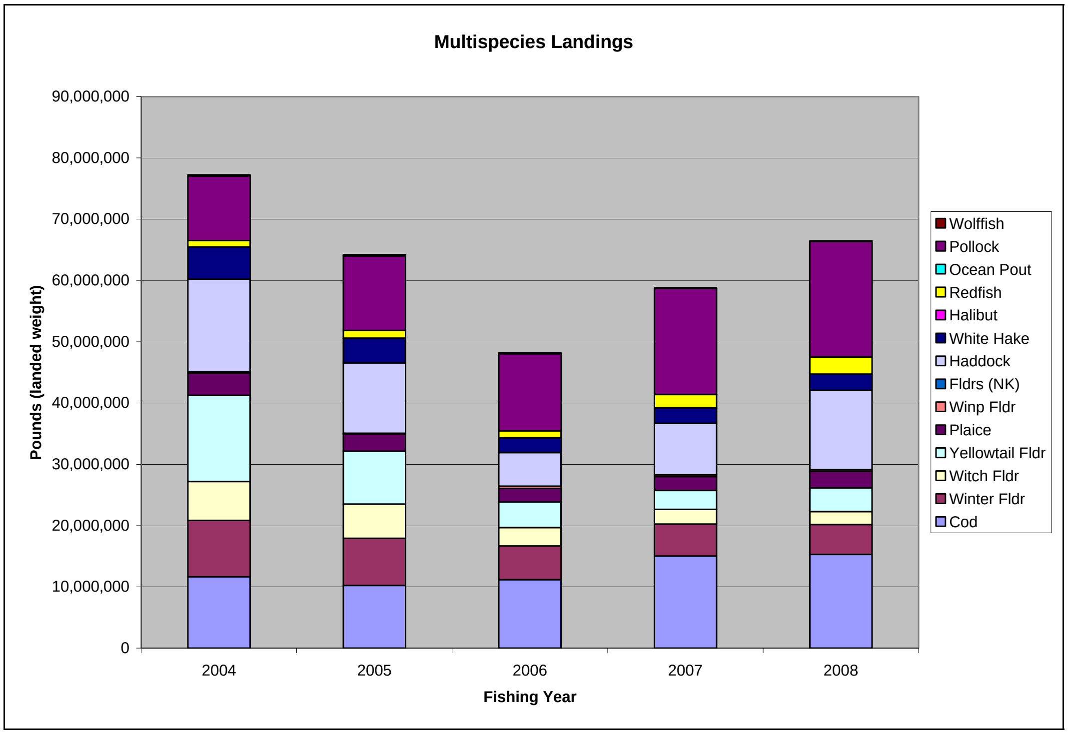
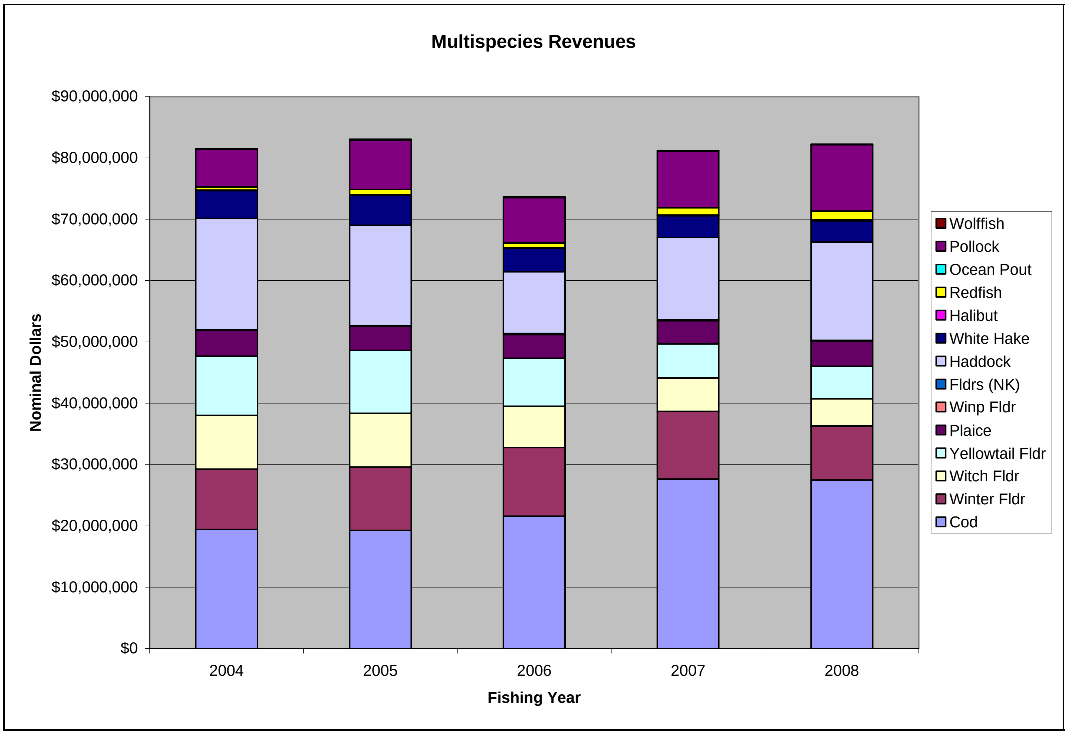


Figure 9 – Multispecies nominal revenues by species, FY 2004 – FY 2008



The number of permits landing groundfish declined from 961 in FY 2004 to 686 in FY 2008. These values include landings by all permit categories. Over 95 percent of groundfish landings are by vessels in the individual DAS permit category. These permits are often considered the core of the fishery and the following discussions will highlight the changes for this group. The number of these permits landing groundfish declined from 691 in FY 2004 to 505 in FY 2008, a decline of 27 percent since the implementation of Amendment 13. At the same time, the groundfish revenues per permit increased in this category from $97.7 thousand in FY 2004 to $117.8 thousand in FY 2008 (constant 1999 dollars, Table 50 and Table 51).

Table 50 – Number of permits landing groundfish, FY 2004 – FY 2008

	2004	2005	2006	2007	2008
Individual	691	634	593	531	505
Small Vessel Exemption	2	1	2	4	4
Hook Gear	35	33	22	18	14
Combination Vessel	18	17	12	18	13
Large Mesh	28	22	17	11	7
Handgear A	46	34	26	23	32
Handgear B	76	61	60	74	64
Other Open Access	65	53	63	62	47
Total	961	855	795	741	686

Table 51 - Groundfish revenues (constant 1999 dollars) per permit

	2004	2005	2006	2007	2008
Individual	$96,771	$109,130	$102,068	$118,132	$117,799
Small Vessel Exemption	Conf.	Conf.	Conf.	$744	$847
Hook Gear	$23,678	$26,535	$17,452	$18,717	$18,072
Combination Vessel	$97,975	$70,340	$44,633	$40,418	$82,736
Large Mesh	$49,751	$34,532	$32,589	$18,376	$163,584
Handgear A	$3,983	$1,392	$4,524	$4,731	$3,892
Handgear B	$1,185	$1,235	$1,310	$2,809	$1,941
Other Open Access	$1,715	$1,567	$5,097	$2,728	$1,878
Total	$74,194	$84,474	$78,638	$87,022	$90,820

6.6.3.2.2 Landings and Revenues by Length Class

When groundfish landings and revenues (constant 1999 dollars) are examined by vessel length, it is clear that vessels less than 30 feet in length have become an inconsequential component of the fishery since FY 2004, accounting for less than one-tenth of a percent of landings in FY 2008. Vessels between 30 and 50 feet in length actually increased groundfish landings (+28 percent) and revenues (+14 percent) from FY 2004 to FY 2008, the only vessel size class to do so. Vessels between 50 and 75 feet saw landings decline by 30.5 percent and revenues decline by 21.8 percent. Vessels 75 feet and over saw landings decline by 18.3 percent and revenues decline by 19.5 percent. These changes are somewhat surprising, as many believed that the smaller vessels size class (30-50 feet) would suffer the most from the differential DAS counting measures adopted in FW 42 (Table 52).

Table 52 – Groundfish landed weight and constant (1999) dollars by vessel length class

		Fishing Year				
Length Group	Data	2004	2005	2006	2007	2008
Less than 30	Weight (lbs.)	480,973	146,590	111,993	70,667	57,250
	Dollars	$518,424	$201,463	$134,229	$105,350	$65,147
30 to less than 50	Weight (lbs.)	15,975,112	15,514,340	13,767,506	17,269,922	20,504,026
	Dollars	$17,325,040	$18,620,985	$16,776,424	$18,529,843	$19,796,929
50 to less than 75	Weight (lbs.)	31,223,980	24,542,026	18,365,249	19,791,111	21,723,950
	Dollars	$26,661,714	$26,827,521	$23,738,294	$22,144,339	$20,858,444
75 and over	Weight (lbs.)	29,601,487	24,066,362	16,142,254	21,792,737	24,198,634
	Dollars	$26,796,080	$26,577,010	$21,868,655	$23,704,081	$21,582,091
Total Landed Weight (lbs.)		77,281,552	64,269,318	48,387,002	58,924,437	66,483,860
Total Constant (1999) Dollars		$71,301,257	$72,226,979	$62,517,603	$64,483,613	$62,302,610

6.6.3.2.3 Landings and Revenues by Homeport State

Each permit holder declares a homeport state on all permit applications. When evaluating impacts of regulations on individual states, summarizing landings and revenues by these homeport states may indicate differential impacts under the assumption that the economic benefits of fishing activity return primarily to these homeport states. Landings and revenues by homeport state are shown in Table 53 and Table 54. Vessels claiming Maine, New Hampshire, Massachusetts, or Rhode Island as homeport state landed 96 percent of the groundfish in FY 2008, a slight increase from the 93 percent landed in FY 2004. Of these four states, only New Hampshire vessels increased groundfish landings from FY 2004 to FY 2008 by 1.9 million pounds, or 56 percent. In FY 2008 Maine vessels landed 98 percent of the groundfish they landed in FY 2004, while Massachusetts vessels landed 87 percent of what was landed in FY 2004. Groundfish landings by Rhode Island vessels declined to 43 percent of the FY 2004 value. Again, these changes are somewhat surprising in that the inshore differential DAS area in the GOM was expected to reduce groundfish landings for New Hampshire vessels. Revenue changes differed only slightly from the changes in groundfish landed weight with the exception of Rhode Island, where the 57 percent decline in landings led to only a 38 percent decline in groundfish revenues.

But as previously noted revenues (constant 1999 dollars) from other fisheries are key components of the income for permit holders. When total revenues by homeport state are examined for the core groundfish vessels - the Individual DAS permits – a different picture emerges. From FY 2004 to FY 2008, total revenue declines were similar for individual DAS permits claiming homeport states of Maine (-11 percent), Massachusetts (-12 percent), and Rhode Island (-13 percent). Total revenues for New Hampshire permits increased by 13 percent (Table 55).

Table 53 – Groundfish landings by homeport state, FY 2004 – FY 2008

Homeport State	2004	2005	2006	2007	2008
CT	44,916	20,744	91,739	189,999	218,419
ME	12,348,854	11,565,820	8,611,001	11,240,196	12,067,158
MA	50,702,142	40,489,242	30,784,454	37,684,924	44,141,437
NH	3,346,377	3,170,158	2,795,023	3,944,409	5,224,038
RI	6,114,406	5,319,875	3,661,606	3,611,712	2,616,902
NJ	657,135	599,466	557,385	517,943	386,105
NY	1,722,950	1,315,094	1,016,606	961,635	840,491
NC	1,356,537	1,113,425	410,869	359,894	492,182
OTHER	988,235	675,494	458,319	413,725	497,128
Grand Total	77,281,552	64,269,318	48,387,002	58,924,437	66,483,860

Table 54 – Groundfish revenues (constant 1999 dollars) by homeport state, FY 2004 – FY 2008

Homeport State	2004	2005	2006	2007	2008
CT	$54,177	$12,362	$155,887	$280,790	$245,458
ME	$10,822,914	$12,050,536	$9,366,964	$10,186,039	$10,406,038
MA	$48,164,703	$47,268,256	$41,237,285	$42,624,942	$41,263,324
NH	$3,276,638	$3,184,183	$2,665,476	$3,534,547	$5,182,273
RI	$4,838,032	$5,613,998	$5,527,044	$4,924,134	$3,018,019
NJ	$662,121	$636,116	$873,485	$805,938	$473,936
NY	$1,605,484	$1,633,937	$1,509,486	$1,282,188	$924,186
NC	$914,559	$1,021,951	$616,740	$466,787	$407,811
OTHER	$962,629	$805,639	$565,236	$378,248	$381,566
Grand Total	$71,301,257	$72,226,979	$62,517,603	$64,483,613	$62,302,610

Table 55 – Total revenues for individual DAS permit holders, FY 2004 – FY 2008

Homeport State	2004	2005	2006	2007	2008
CT	$183,134	$284,550	$425,969	$1,299,755	$2,114,618
ME	$17,870,251	$18,962,386	$15,972,821	$16,382,729	$15,828,700
MA	$76,375,184	$88,616,943	$79,001,706	$74,695,252	$67,579,733
NH	$5,570,041	$6,453,317	$5,006,177	$5,974,224	$6,321,118
NJ	$10,060,159	$12,791,005	$11,042,013	$10,762,757	$10,358,704
NY	$16,578,096	$16,860,322	$16,034,157	$13,012,111	$13,826,474
RI	$25,496,648	$28,137,507	$27,979,994	$22,810,517	$22,218,766
NC	$4,972,802	$5,634,474	$3,387,060	$1,399,928	$1,504,077
OTHER	$4,360,703	$2,967,187	$2,408,244	$912,223	$1,645,689
Grand Total	$161,467,018	$180,707,691	$161,258,141	$147,249,497	$141,397,879

6.6.3.2.4 Landings and Revenues by Port Group

In this section, landings and revenues are summarized by the place of landing, with individual ports grouped into a series of port groups first used to characterize fishing activity in Amendment 13. This is a different way of looking at the economic activity generated by groundfish fishing activity. Maine ports experienced a large drop in groundfish landings over this period, with the state as a whole seeing groundfish landings decline by 53 percent. In contrast, Coastal New Hampshire experienced a 4 percent increase, Gloucester and the North Shore a 54 percent increase (almost all since FY 2006), and Boston and the South Shore a 75 percent increase – with the increase occurring since FY 2006. With respect to revenues, only Gloucester/North Shore (+24 percent) and Boston/South Shore (+46 percent) increased groundfish revenues from FY 2004 to FY 2008. In spite of a slight increase in landed weight, New Hampshire port groundfish revenues declined by 17 percent from FY 2004 to FY 2008. New Bedford MA was the top groundfish port group in FY 2004, but by FY 2006 ceded the top ranking to Gloucester/North Shore MA.

When groundfish revenues and landings by homeport state are compared to the same data by port group, it is clear that some vessels in Maine and New Hampshire no longer land in those states. Given the changes in Gloucester and Boston, it is likely (though not yet confirmed) that vessels that used to land in Maine now land in other ports.

As with revenues by homeport state, the total revenues for individual DAS permits differs from the changes noted for groundfish revenues. Gloucester/North Shore and Boston/South Shore show a 32 percent and 48 percent increase in total revenues for individual DAS permits. Coastal NH showed a 23 percent decline, while Lower Mid-Coast Maine experienced a 58 percent decline in total revenues for individual DAS vessels. New Bedford experienced a 22 percent decline. Most other port groups experienced declines as well.

6.6.3.2.5 Summary

Several broad themes emerge from an examination of the landings and revenue data. First, contrary to expectations, some ports in the inshore GOM have weathered recent regulatory restrictions relatively well - Gloucester/North Shore and Boston/South Shore in particular. These two ports increased groundfish landings and revenues since FY 2004, while the expectation from FW 42 was that there would be declines. It appears that these increases may have occurred in part at the expense of other ports, such as those in Maine. Second, again contrary to the common wisdom, vessels in the 30 to 50 foot range have also increased their groundfish landings and revenues. The expectation from FW 42 was that this group would be hampered by the stringent regulations in the inshore GOM, particularly the differential DAS counting areas. Third, there is evidence of the concentration of goundfish landings into fewer port groups, driven by the increase in importance of Gloucester and Boston. Fourth, the number of permits landing groundfish continues to decline. The decline in permits and the concentration of groundfish landings in key ports may have implications for social and community impacts as the fishery shifts to sectors with the adoption of Amendment 16. Finally, the regulatory restrictions designed to control groundfish landings have also tended to reduce total landings and revenues for the individual DAS permit holders.

Table 56 – Groundfish landings by port group, FY 2004 – FY 2008

		Fishing Year				
	Port Group	2004	2005	2006	2007	2008
ME	DOWNEAST ME		2,815	1,780	3,191	3,884
	LOWER MID_COAST ME	13,822,854	11,390,361	6,913,858	7,220,350	6,756,913
	ME					48
	SOUTHERN ME	559,631	458,892	272,039	228,630	71,651
	UPPER MID_COAST ME	651,447	581,538	50,783	150,556	162,746
	Total	15,033,932	12,433,606	7,240,219	7,602,727	6,996,012
MA	BOSTON / SOUTH SHORE	5,216,066	5,091,528	4,351,885	7,947,857	9,134,345
	CAPE AND ISLANDS	3,941,488	3,466,607	1,975,394	2,624,889	3,143,722
	GLOUCESTER /NORTH SHORE	14,708,843	15,429,355	14,235,393	19,044,659	22,647,831
	NEW BEDFORD COAST	31,436,468	22,076,741	13,975,919	15,240,663	18,571,310
	Total	55,302,865	46,064,231	34,538,591	44,858,068	53,497,208
NH	COASTAL NH	3,520,796	3,270,963	3,248,560	2,933,814	3,650,500
RI	COASTAL RI	2,645,309	1,876,245	2,334,131	2,568,854	1,698,956
	Total	2,645,309	1,876,245	2,334,417	2,568,854	1,699,003
CT	COASTAL CT				34,238	99,919
NY	LONG ISLAND NY	357,407	323,905	568,942	498,920	321,871
	Total	358,877	324,175	569,002	498,920	322,353
NJ	NORTHERN COASTAL NJ	407,040	296,113	450,506	423,277	216,855
	SOUTHERN COASTAL NJ	2,704	1,437	4,406	3,669	707
	Total	409,744	297,550	454,912	426,946	217,562
Other		10,029	2,548	1,301	870	1,303
Total		77,281,552	64,269,318	48,387,002	58,924,437	66,483,860

Table 57 – Groundfish revenues (constant 1999 dollars) by port group, FY 2004 – FY 2008

		Fishing Year				
State	**Port Group**	**2004**	**2005**	**2006**	**2007**	**2008**
CT	COASTAL CT				$58,136	$124,460
	DOWNEAST ME		$11,443	$7,640	$13,113	$15,655
	LOWER MID_COAST	$12,306,848	$11,752,197	$7,741,772	$6,703,526	$7,165,928
	SOUTHERN ME	$583,903	$455,095	$303,841	$214,573	$59,038
	UPPER MID_COAST	$547,824	$645,058	$66,849	$182,348	$152,130
ME	Total	$13,438,575	$12,863,794	$8,123,764	$7,113,559	$7,394,024
	BOSTON / SOUTH SHORE	$5,455,998	$6,085,710	$5,956,670	$7,946,000	$7,944,989
	CAPE AND ISLANDS	$4,792,674	$4,748,862	$2,990,911	$3,624,090	$3,239,512
	GLOUCESTER AND NORTH SHORE	$15,340,838	$18,017,107	$16,837,096	$18,366,900	$19,017,135
	NEW BEDFORD COAST	$25,796,892	$24,186,247	$20,543,177	$19,899,518	$19,016,640
MA	Total	$51,386,401	$53,037,927	$46,327,853	$49,836,509	$49,218,275
NH	COASTAL NH	$3,438,552	$3,126,812	$2,730,512	$2,397,925	$2,847,136
	NORTHERN COASTAL	$481,599	$413,679	$725,030	$690,092	$308,693
	SOUTHERN COASTAL	$3,261	$1,314	$6,804	$3,215	$703
NJ	Total	$484,859	$414,993	$731,834	$693,307	$309,395
	LONG ISLAND NY	$389,164	$441,206	$831,152	$729,412	$388,555
NY	Total	$389,670	$441,548	$831,203	$729,412	$389,185
RI	COASTAL RI	$2,152,964	$2,340,605	$3,770,813	$3,654,369	$2,019,089
RI	Total	$2,152,964	$2,340,605	$3,771,153	$3,654,369	$2,019,170
Other		$10,487	$2,159	$1,286	$395	$173
Total		$71,300,039	$72,225,364	$62,517,020	$64,483,613	$62,302,610

Table 58 – Total revenues for individual DAS permits, FY 2004 – FY 2008

		Fishing Year				
STATE	**Port Group**	**2004**	**2005**	**2006**	**2007**	**2008**
CT	COASTAL CT				$788,821	$2,004,384
ME	DOWNEAST	$228,809	$113,455	$94,560	$209,194	$284,793
	LOWER MID_COAST	$18,438,837	$16,530,492	$11,090,711	$9,138,795	$7,814,395
	SOUTHERN	$872,608	$762,299	$1,023,711	$758,089	$313,965
	UPPER MID_COAST	$2,534,482	$2,111,334	$3,030,150	$3,165,765	$3,681,638
	(blank)				$42,713	$8,673
	Total	$22,074,737	$19,518,612	$15,243,772	$13,314,556	$12,103,787
MA	BOSTON AND SOUTH SHORE	$7,592,991	$9,517,082	$9,907,935	$12,046,260	$11,234,338
	CAPE AND ISLANDS	$9,267,111	$13,417,925	$10,727,904	$10,227,461	$8,950,480
	GLOUCESTER AND NORTH SHORE	$19,301,382	$28,464,975	$26,324,319	$27,682,206	$25,565,013
	NEW BEDFORD COAST	$39,369,798	$43,178,981	$36,815,661	$32,397,871	$30,698,621
	Total	$75,531,282	$94,578,964	$83,777,928	$82,353,799	$76,448,453
NH	COASTAL NH	$5,404,665	$5,816,870	$4,638,745	$4,038,530	$4,182,535
RI	COASTAL RI	$25,023,406	$26,641,997	$28,267,431	$20,895,853	$20,972,620
NJ	NORTHERN COASTAL NJ	$7,814,960	$10,905,698	$8,977,443	$8,239,473	$7,400,068
	SOUTHERN COASTAL NJ	$5,024,150	$3,147,760	$3,045,396	$3,912,248	$5,129,592
NJ	Total	$12,839,111	$14,053,459	$12,022,838	$12,151,721	$12,529,660
NY	LONG ISLAND NY	$13,134,080	$13,679,255	$13,579,440	$11,129,898	$10,364,426
	NY	$375,577	$175,014	$58,702	$330,767	$49,460
NY	Total	$13,509,657	$13,854,269	$13,638,142	$11,460,665	$10,414,399
Other		$20,593,818	$20,097,790	$17,307,426	$13,706,217	$13,156,440
Total		$161,467,018	$180,707,691	$161,258,141	$147,249,497	$141,397,879

6.6.4 Status of Proposed Groundfish Sector Membership

Amendment 16 established 17 new sectors and reauthorized the two existing sectors. People who held groundfish permits were required to sign up for sectors by September 1st, 2009. The following section presents an overview of sector membership as of the September 2009 registration date. However, there are no regulations that require NMFS to hold any person to sector membership prior to May 1st of 2010, so anyone is allowed to leave a sector for the common pool prior to that date unless bound by a private contract with the sector. The actual number of people fishing in sectors in 2010 is therefore subject to change. NMFS recently announced that permit owners can choose to join a sector until November 20th, 2009.

Roughly half of the groundfish permits have chosen to remain in the common pool (757 of 1480). The sector with the greatest number of permits is the Sustainable Harvest Sector (93 permits), followed closely by the GB Cod Fixed Gear Sector (88 permits). The NEFS XII has the smallest number of permits with 10. The common pool has the most Category A DAS allocated under Amendment 16 (3601.2 days), while the Northeast Coastal Communities Sector has the least (143 days). Permits that have signed up for the common pool are associated with vessels that have a smaller average base length (39.7 ft.) than any sector except the GB Cod Fixed Gear Sector. The sector with the largest average base length for vessels is the NEFS IX (81.1 ft.).

Table 59 – Status of sector membership as of September 1st, 2009, with respect to A16 A DAS, number of permits, and average base length

SECTOR NAME	Sum of A16 Category A DAS	Number of Permits	Average Base Length (in ft.)
Common Pool	3601.2	757.0	39.7
GB Cod Fixed Gear Sector	1470.3	88.0	38.5
Northeast Coastal Communities Sector	143.0	19.0	40.2
NEFS II	1736.3	75.0	52.6
NEFS III	1453.1	74.0	40.2
NEFS IV	1152.6	47.0	54.4
NEFS IX	1134.2	44.0	81.1
NEFS V	798.6	39.0	66.2
NEFS VI	588.0	21.0	71.0
NEFS VII	660.7	25.0	79.7
NEFS VIII	567.1	22.0	79.2
NEFS X	663.8	33.0	46.1
NEFS XI	1047.0	47.0	43.1
NEFS XII	210.0	10.0	43.6
NEFS XIII	703.2	31.0	75.3
Port Clyde Community Groundfish Sector	762.0	39.0	42.3
Sustainable Harvest Sector	2753.0	93.0	68.2
Tri-State Sector	419.1	16.0	65.7
Grand Total	19863.1	1480.0	47.6

The state with the greatest number of permits in the common pool is Massachusetts (291 permits). The next states with the most common pool permits are New York (100), Maine (91), and New Jersey (88).

Table 60 – Common pool owner mailing addresses, state and number of permits

CT	17
DE	2
FL	2
GA	1
MA	291
MD	6
ME	91
NC	12
NH	37
NJ	88
NY	100
RI	65
VA	17

Of the vessels in the common pool, 477 have no DAS allocated. The remaining 280 permits have 3,601 DAS, or an average of 12.8 DAS. The distribution of DAS is shown in Table 6 – 93 percent of common pool vessels have 20 DAS or fewer. Of the 280 permits with DAS, 105 did not land a single GOM cod during the qualification period. Permits that did land GOM cod during the qualification period have 2,572 DAS.

Table 61 - Category A DAS allocated to common pool vessels

Cat A DAS Allocated	*Frequency*	*Cumulative %*
0	477	63.10%
>0 – 10	116	78.44%
> 10 – 20	112	93.25%
> 20 – 30	48	99.60%
> 30 – 40	3	100.00%
50	0	100.00%
More	0	100.00

The size distribution (permit baseline length) of vessels in the common pool that have DAS is similar to the size of all vessels eligible for sectors, but the common pool actually has a smaller percentage of large vessels (Table 62).

Table 62 – Baseline length of permits in common pool and all permits

	Common Pool		**All Permits**	
Length	**Frequency**	**Cumulative %**	**Frequency**	**Cumulative %**
0	0	0.00%	0	0.00%
> 0 - 30	15	5.38%	68	5.11%
> 30 - 50	137	54.48%	677	55.93%
> 50 -75	100	90.32%	362	83.11%
More	27	100.00%	225	100.00%

The vessels that are in the common pool based on September 1, 2009 rosters have small PSCs for pollock. This suggests these permits do not have a history of targeting pollock in the past. It is unclear whether these vessels will choose to target a low value species like pollock under the proposed effort controls.

Table 63 – Distribution of FY 2010 pollock ACE/DAS for permits eligible to join sectors

Pollock/DAS	*Frequency*	*Cumulative %*
0	83	8.57%
250	679	78.72%
500	83	87.29%
1000	62	93.70%
1500	27	96.49%
2000	15	98.04%
More	19	100.00%

The total PSC for allocated multispecies stocks for each sector is shown in Table 64. NEFS II, III, and XI and the Sustainable Harvest Sector have the largest shares of GOM cod. GB cod allocations are largest for the GB Cod Fixed Gear Sector, NEFS IX, and the Sustainable Harvest Sector. The largest GOM haddock allocations are to the NEFS II and III sectors and the Sustainable Harvest Sector. GB Haddock allocations are largest for the NEFS II, XIII, and Sustainable Harvest Sectors. NEFS II and XI and the Sustainable Harvest Sectors have the largest allocations of pollock.

Table 64 – Total PSC allocations for sectors according to September 1, 2009 membership rosters

SECTOR NAME	GOM Cod	GB Cod	GOM Haddock	GB Haddock	CCGOM YTF	GB YTF	SNE/MA YTF	Pollock	Redfish	White Hake	Plaice	GOM Winter Flounder	GB Winter Flounder	Witch Flounder
Common Pool	0.0738	0.0506	0.0475	0.0279	0.0672	0.0648	0.2735	0.0431	0.0341	0.0474	0.0645	0.1649	0.0297	0.0495
GB Cod Fixed Gear	0.0190	0.2796	0.0129	0.0640	0.0183	0.0001	0.0018	0.0780	0.0289	0.0592	0.0055	0.0224	0.0003	0.0080
Northeast Coastal Communities	0.0051	0.0016	0.0025	0.0012	0.0046	0.0084	0.0053	0.0046	0.0048	0.0090	0.0024	0.0047	0.0007	0.0027
NEFS II	0.1894	0.0547	0.1767	0.1163	0.1932	0.0170	0.0164	0.1226	0.1654	0.0610	0.0836	0.1988	0.0167	0.1327
NEFS III	0.1539	0.0106	0.1085	0.0016	0.0892	0.0005	0.0040	0.0679	0.0113	0.0451	0.0423	0.1081	0.0003	0.0291
NEFS IV	0.0855	0.0471	0.0659	0.0542	0.0719	0.0216	0.0268	0.0562	0.0638	0.0785	0.0857	0.0763	0.0071	0.0912
NEFS IX	0.0164	0.1197	0.0475	0.0997	0.0918	0.1672	0.0645	0.0372	0.0578	0.0407	0.0721	0.0255	0.3245	0.0747
NEFS V	0.0025	0.0306	0.0068	0.0552	0.0170	0.0943	0.2534	0.0055	0.0060	0.0052	0.0262	0.0071	0.0244	0.0290
NEFS VI	0.0213	0.0273	0.0356	0.0295	0.0226	0.0210	0.0490	0.0378	0.0561	0.0437	0.0412	0.0339	0.0270	0.0471
NEFS VII	0.0058	0.0614	0.0064	0.0517	0.0526	0.1690	0.0449	0.0077	0.0054	0.0077	0.0423	0.0323	0.1755	0.0411
NEFS VIII	0.0047	0.0736	0.0020	0.0661	0.0729	0.1593	0.0596	0.0064	0.0044	0.0051	0.0244	0.0336	0.2063	0.0313
NEFS X	0.0428	0.0079	0.0212	0.0068	0.0966	0.0134	0.0096	0.0141	0.0056	0.0091	0.0129	0.1195	0.0068	0.0192
NEFS XI	0.1368	0.0040	0.0323	0.0004	0.0221	0.0000	0.0001	0.0928	0.0188	0.0485	0.0187	0.0213	0.0000	0.0186
NEFS XII	0.0151	0.0002	0.0036	0.0000	0.0057	0.0000	0.0004	0.0014	0.0007	0.0011	0.0043	0.0043	0.0002	0.0033
NEFS XIII	0.0075	0.0732	0.0059	0.1342	0.0315	0.1397	0.0983	0.0218	0.0447	0.0177	0.0337	0.0149	0.1002	0.0446
Port Clyde Community Groundfish	0.0464	0.0020	0.0231	0.0005	0.0071	0.0000	0.0065	0.0429	0.0255	0.0461	0.0630	0.0179	0.0001	0.0434
Sustainable Harvest	0.1601	0.1452	0.3520	0.2724	0.0982	0.0696	0.0802	0.3474	0.4562	0.4191	0.3416	0.0575	0.0639	0.3021
Tri-State	0.0141	0.0108	0.0495	0.0184	0.0375	0.0541	0.0055	0.0127	0.0104	0.0557	0.0356	0.0571	0.0163	0.0324
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

6.6.5 Economic Status of Scallop Fleet

6.6.5.1 Trends in Landings, prices and revenues

In the fishing years 2002-2007, the landings from the northeast sea scallop fishery stayed above 50 million pounds, surpassing the levels observed historically (Figure 10). The recovery of the scallop resource and consequent increase in landings and revenues was striking given that average scallop landings per year were below 16 million pounds during the 1994-1998 fishing years, less than one-third of the present level of landings. The increase in the abundance of scallops coupled with higher scallop prices increased the profitability of fishing for scallops by the general category vessels. As a result, general category landings increased from less than 0.4 million pounds during the 1994-1998 fishing years to more than 5 million pounds during the last three fishing years (2005-2007), peaking at 7 million pounds in 2005 or 13.5% of the total scallop landings.

Figure 10 - Scallop landings by permit category and fishing year (dealer data)

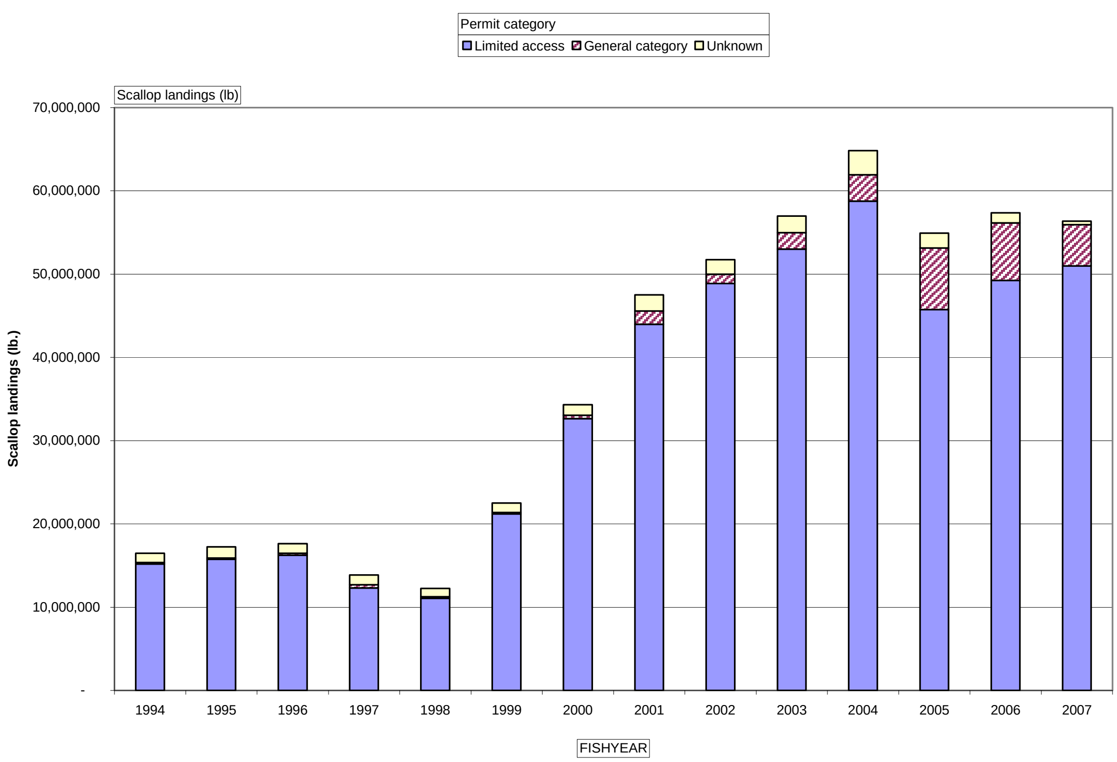


Figure 11 shows that total fleet revenues for the limited access vessels tripled from about $100 million in 1994 to over $300 million in 2007 in inflation-adjusted 2006 dollars. Scallop ex-vessel prices increased after 2001 as the composition of landings changed to larger scallops that in general command 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 and in fact, the inflation adjusted ex-vessel price of scallops in 2007 was lower than the price in 1994. 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. Figure 12 shows that average landings and revenue per limited access vessel more than doubled in recent years compared to the period 1994 -1998. The number of active vessels increased by 50 % (from about 220 in 1994 to 346 in fishing year 2007) resulting in tripling of total fleet scallop landings and revenue in 2007 compared to 1994 (Figure 12).

Figure 11 - Trends in total scallop landings, revenue and ex-vessel price by fishing year (limited access fishery only)

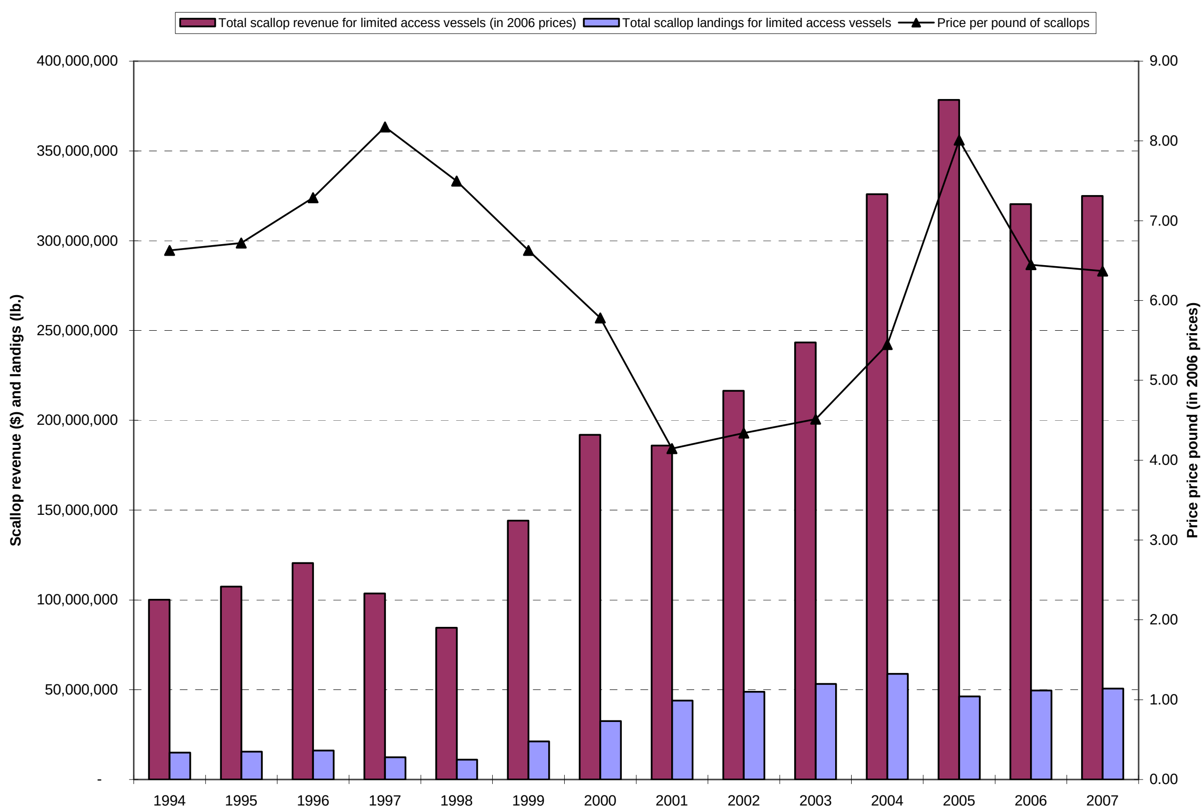
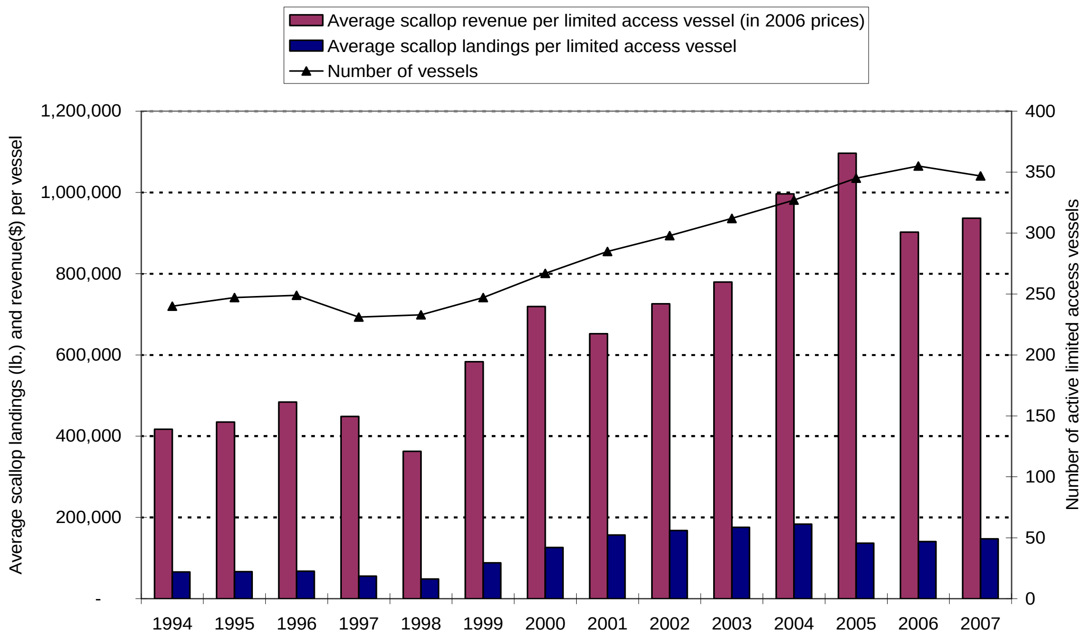


Figure 12 - Trends in average scallop landings and revenue per full time vessel and number of active vessels (including full-time, part-time and occasional vessels)



The trends in revenue per full-time vessel were similar to the trends for the fleet as a whole. The following analyses show the trends for 124 full-time vessels that were active in the scallop fishery for 14 years; that is, for every year from fishing year 1994 to the end of fishing year 2007. In addition, each vessel in this group used more than 50% of their DAS allocation, and average HP was 904 and GRT was 167 for this group of vessels. This group was selected so that the average trends will not be biased by including vessels that participated in the fishery only a few years, mainly in the recent years. For example, there were about 56 full-time vessels that were active for 4 years or less as of the 2006 fishing year. These vessels had a lower fishing power (smaller HP and GRT) and consequently had lower revenues and profits than the 124 full-time vessels included in the sample. Including these smaller vessels would reduce the average profits and revenues in the recent years relative to the earlier fishing years and would underestimate the increase in average profit per full-time vessel in recent years. Similarly, the full-time vessels that used less than 50% of their DAS allocation either because of choice or because of data inaccuracies are not included in the sample group of full-time vessels, because including them would either underestimate the average revenue or trip costs per vessel, resulting in lower profits in the first and higher profits in the second case.

Figure 13 shows that average scallop revenue per full-time vessel in the sample of 124 vessels doubled from about $538,000 in 1994 to over 1,080,000 in 2007 despite the fact that inflation adjusted ex-vessel price per pound of scallops was slightly higher in 1994 ($6.60 per pound) compared to the ex-vessel price in 2007 ($6.40 per pound). In other words, the doubling of revenue was the result of the doubling of the average scallop landings per vessel in 2007 (over 169,000 pounds) from its level in 1994 (over 81,500 pounds). The total fleet revenue for all the limited access vessels more than tripled during the same years as new vessels became active. Average scallop revenue per full-time vessel peaked in the 2005 fishing year to over $1.3 million as a result of higher landings combined with an increase in ex-vessel price to about $8.00 per pound of scallops.

Figure 13 - Trends in average scallop landings and revenue per full time vessel (sample of 124 vessels)

6.6.5.2 Trends in effort

6.6.5.2.1 Trends in DAS-used

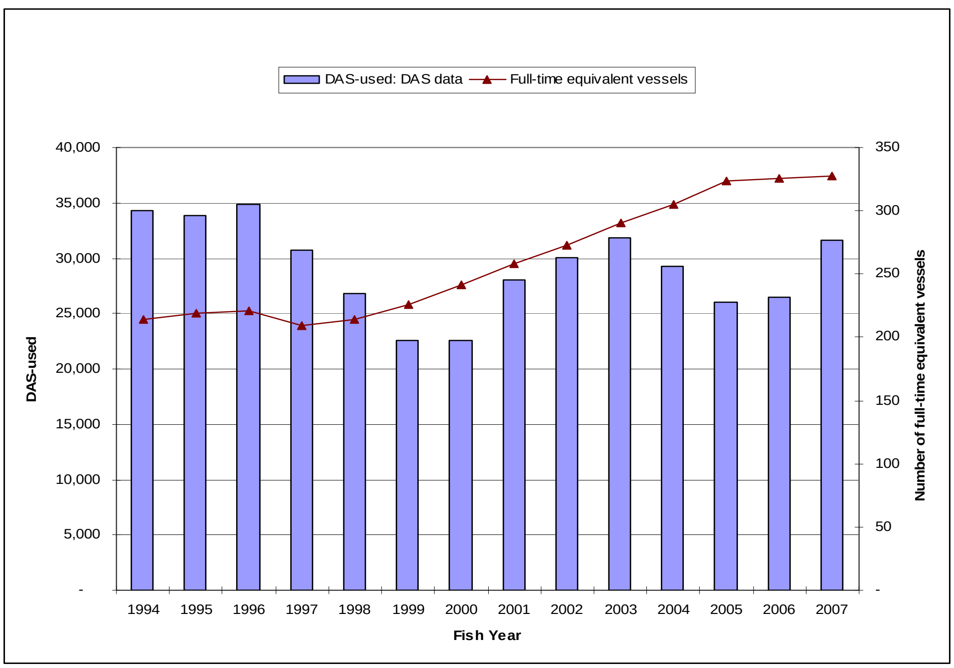
There has been a steady decline in the total DAS used by the limited access scallop vessels from the 1994 to 2001 fishing years as a result of the effort-reduction measures of Amendment 4 (1994) and Amendment 7 (1999)). DAS allocations during this period were reduced almost by half from 204 DAS in 1994 to 120 DAS for the full-time vessels and in the same proportions for the part-time and occasional vessels from their base levels in 1994 (Table 65). As a result, DAS used reached the lowest levels of about 22,550 days in the 1999 and 2000 fishing years from about 34,000 days in 1994, even though the number of full-time equivalent vessels increased during these years from 214 vessels in 1994 to 241 vessels in 2000 (Figure 14). Average DAS used per full-time vessel declined from 161 days in 1994 to 93 days in 2000. The low levels of resource abundance discouraged many vessels from fishing for scallops during those years.

Table 65 - DAS and trip allocations per full-time vessel

Year	Allocations based on the Management Action	Total DAS Allocation (1)	Estimated Open area DAS allocations (2)	Access area trip allocations (3)	DAS charge or equivalent per access area trip (4)	Equivalent (estimated) DAS allocation for access areas (5)
1994	Amendment 4	204	None	None		None
1995	Amendment 4	182	None	None		None
1996	Amendment 4	182	None	None		None
1997	Amendment 4	164	None	None		None
1998	Amendment 4	142	None	None		None
1999	Amendment 7, Framework 11	120	90 to 120	3	10	0 to 30
2000	Framework 13	120	60 to 120	6	10	0 to 60
2001	Framework 14	120	90 to 120	3	10	0 to 30
2002	Framework 14	120	90 to 120	3	10	0 to 30
2003	Framework 15	120	90 to 120	3	10	0 to 30
2004	Framework 16	126	42 (MAX.62)	7	12	84
2005	Framework 16	100	40 (MAX.117)	5	12	60
2006	Framework 18	112	52	5	12	60
2007	Framework 18	111	51	5	12	60

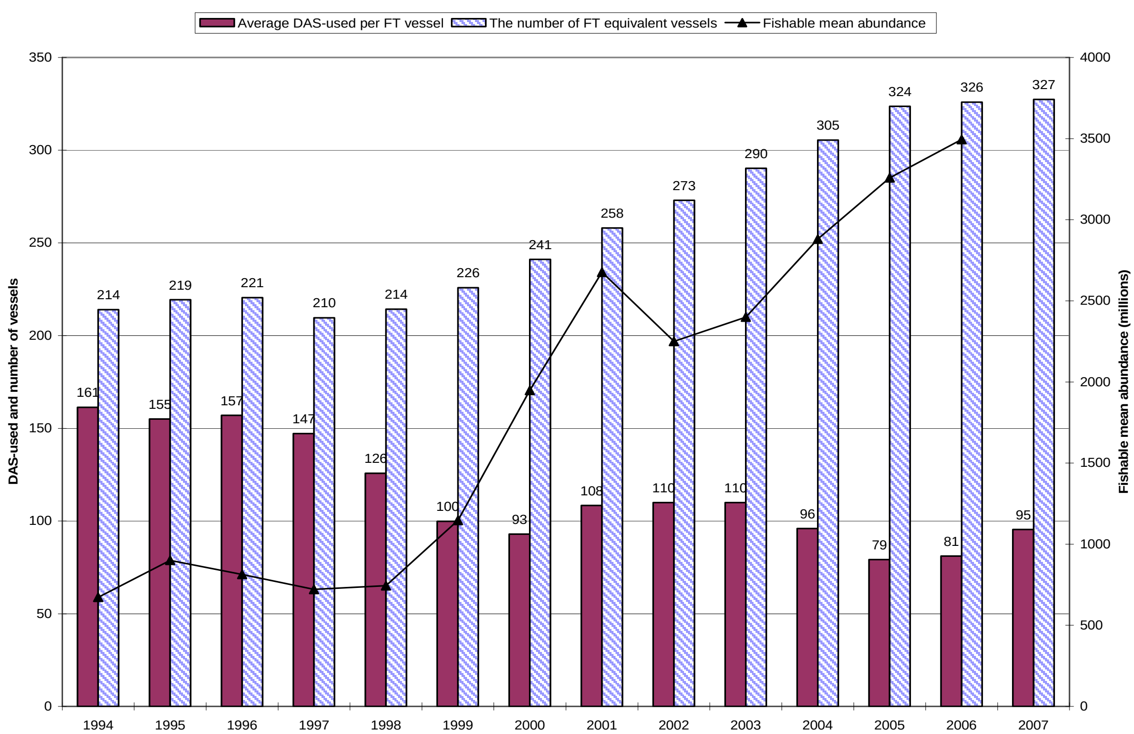
(1) Total DAS allocation per full-time vessel represents a rough estimate for years 2004-07 since DAS is allocated for open areas only. DAS allocation for access areas is estimated by assuming an equivalent 12 days-at-sea allocation for each access area trip with a possession limit of 18,000 pounds

Figure 14 -Total DAS-used and the number of active (full-time equivalent) vessels in the sea scallop fishery



After fishing year 2000, fishing effort started to increase as vessels spent more DAS and more limited access vessels participated in the sea scallop fishery. The increase in total effort was mostly due to the increase in the number of vessels. The DAS used per full-time vessel increased to 110 days during 2002-2003 fishing years from 93 days in 2000. This level was still significantly lower than DAS used in the mid-1990s (over 150 days, Figure 15). During those years there was no change in the total DAS allocations (120 DAS per full-time vessel).The recovery of the scallop resource and the dramatic increase in fishable abundance after 1999 increased the profits in the scallop fishery, thus leading to an increase in participation by the limited access vessels that had been inactive during the previous years. Georges Bank closed areas were opened to scallop fishing starting in 1999 by Framework 11 (CAII) and later by Framework 13 (CAII, CAI, NLS), encouraging many vessel owners to take the opportunity to fish in those lucrative areas. Frameworks 14 and 15 provided controlled access to Hudson Canyon and VA/NC areas. As a result, 49 new full-time equivalent vessels became active in the sea scallop fishery after 2000 during the next three fishing years. The total number of full-time equivalent vessels reached to 290 in 2003 and total fishing effort by the fleet increased to 31,800 days in 2003 from about 22,600 in 2000 (Figure 14).

Figure 15 - Average DAS-used per full-time vessel, the number of full-time equivalent active vessels and fishable mean abundance in the sea scallop fishery (excluding general category fishery)



Total fishing effort (DAS-used) declined after 2003 even though the number of active vessels increased to 326 vessels in 2006 from 290 vessels in 2003. With the implementation of Amendment 10 (2004) the limited access vessels were allocated DAS for open areas and a number of trips for the specific access areas with no open area trade-offs. The open area allocations were reduced to 42 DAS in 2004 whereas full-time vessels were allocated 7 access area trips in the same year (Table 65, Framework 16). Even though total DAS equivalent allocations remained around the same levels during 2005-07 (at about 110 equivalent days, Table 65), the fishing effort, i.e., fleet DAS used increased in the 2007 fishing year as many vessels took their unused 2005 HCA trips in that year. If not for those HCA trips, the total effort in the scallop fishery would probably have stayed constant during 2005-2007 with almost all qualified limited access vessels participating in the fishery.

6.6.5.2.2 Effort by open and access areas

Until 2004, DAS was allocated for the whole fishing area. Starting with Framework 16, DAS was allocated for the open areas only whereas for access areas the vessels received trip allocations. The unused Georges Bank controlled access area trips could be transferred to open areas due to the closure of access areas when yellowtail flounder catch reaches annual TAC. For example, a vessel that has taken two of three controlled access trips, may fish for 12 additional DAS in the open areas (totaling 42+12=54 DAS for the fishing year). In 2004, the DAS allocation for open areas without access trips was 62 days, meaning that a vessel can transfer no more than 20 DAS from a closed controlled access to open areas. So a vessel that has taken only one of three or has not yet fished in a closed controlled access area, may transfer no more than 20 DAS to the open areas, totaling 62 open area DAS for the fishing year. Table 65 provides the maximum number of DAS that could have been used in open areas due to transferring DAS from unused controlled access trips. DAS transfers were allowed only for the Georges Bank access areas and would exclude Mid-Atlantic access areas. As a results of these transfers and carry-over DAS used by some vessels, average open area DAS-used by full-time vessels were about 52 days in 2004, and 44 days in 2005, higher than the base open area allocations in either year.

Table 66 - DAS-used and the number of trips by full-time vessels by area

AREA	DATA	FISHYEAR			
		2004	2005	2006	2007
ACCESS	Allocated number of trips	7	5	5	5
	Average DAS-used per vessel	45	37	30	49
	Average number of trips per vessel	6	5	5	8 *
	Average trip length	8	8	6	6
	Total number of trips	1636	1371	1386	2390
	Total DAS-used	12864	11039	8681	15492
	Number of full-time vessels fished	289	302	289	317
OPEN	DAS allocation per vessel	42	40	52	51
	Average DAS-used per vessel	52	44	54	46
	Number of trips	8	8	7	6
	Average trip length	8	7	8	9
	Total number of trips	2214	2360	2261	1749
	Total DAS-used	15328	13656	16915	14620
	Number of full-time vessels fished	293	312	317	319
ALL AREAS	Average DAS used per vessel	97	81	84	95
	Total DAS-used	28192	24695	25596	30112
	Total number of active vessels	293	312	317	319

(*) Because of carry-over trips taken in HCA in 2007, number of trips is greater than the number of allocated trips. See Table 68 below.

Framework 16 allocated 4 trips to HCA in 2004 and 3 trips to HCA in 2005 (18,000 pounds each). Because the catch rates were lower than expected in this area, many vessels chose to delay taking their 2005 access trips. For example, Table 68 shows that only 237 out of 312 active full-time vessels took some of their trips to HCA in 2005, averaging about 2.5 trips per vessel. Framework 18 extended

Hudson Canyon access program – such that vessels that did not take their HC trips could take them in either 2006 and/or 2007. Many of these vessels postponed taking those trips until 2007. The number of trips shown could be larger than allocated since some of these trips are compensation trips. The use of HC trips in 2007 is the major reason behind the increase in total effort in 2007 compared to 2006 given that DAS allocations, number of access area trip allocations and the number of active vessels were similar in each year. Table 68 shows that about 5,500 DAS-used in HCA in 2005 which is almost equal to the difference in total effort in 2006 and 2007 fishing years. It also explains that on the average there were more access area trips taken per vessel in 2007 than the allocated 5 trips per vessel by F18. (8 trips per vessel that used that fished in the access areas whereas only 5 trips were allocated by Framework 18). Again, the inclusion of the compensation trips probably overestimates the number of HCA and other access area trips per vessel in Table 66 and Table 68 .

Table 67 - Framework 18 DAS and access area trip allocations

Framework 18 allocations	Open area DAS per FT vessel	Controlled access area trips	Elephant Trunk	Hudson Canyon	Delmarva	Total DAS per FT vessel
DMV - 20K open area DAS in 2006 and 2007 (Proposed Alternative)						
2006	52	1 CAI, 2 CAII, 2 NLS (60 DAS)	Closed	2005 trips	Open	112
2007	51	1 CAI, 1 NLS, 3 ETA (84 DAS)	5 trips*	2005 trips	Closed	111

*Originally F18 allocated 5 trips to ETA which were reduced later to 3 by emergency action.

Table 68 - DAS-used and the number of trips by full-time vessels in Hudson Canyon Access Area

Fishyear	Number of trips per vessel	Average DAS-used per vessel	Total DAS-used	Total number of trips	Number of full-time vessels fished
2004	4.1	34.0	9734	1163	286
2005	2.6	26.1	6181	605	237
2006	1.7	12.2	709	99	58
2007	2.8	24.0	5501	633	229

6.6.5.2.3 Trends in effective fishing effort and vessel characteristics

Figure 16 - Number of limited access vessels by permit category

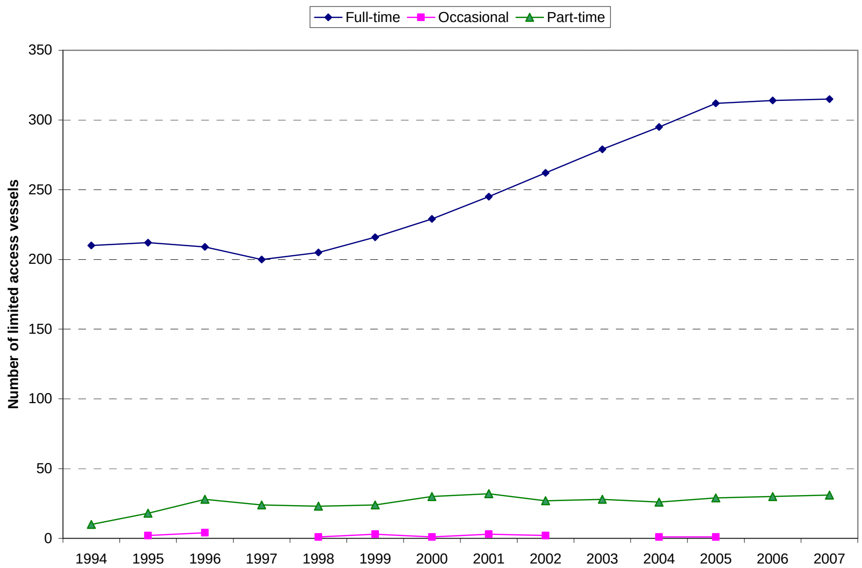


Figure 17 - Number of full-time vessels by permit category

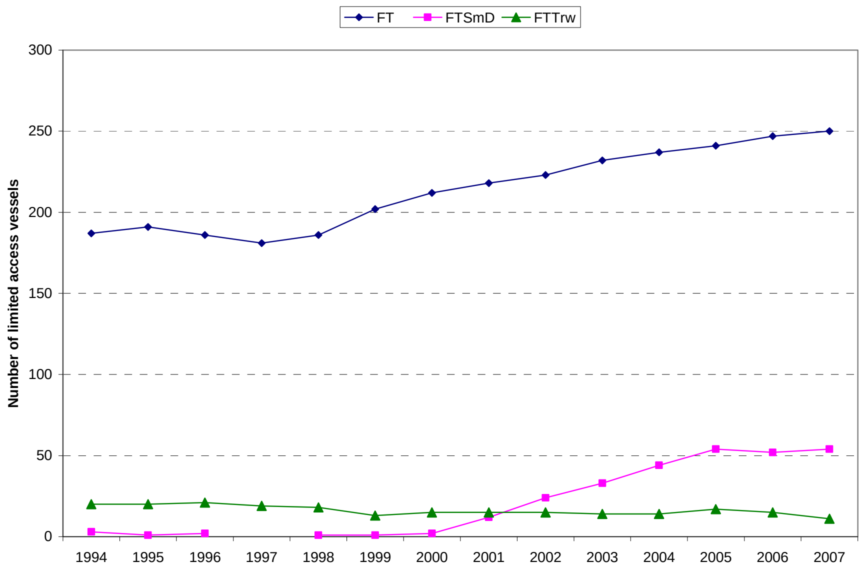
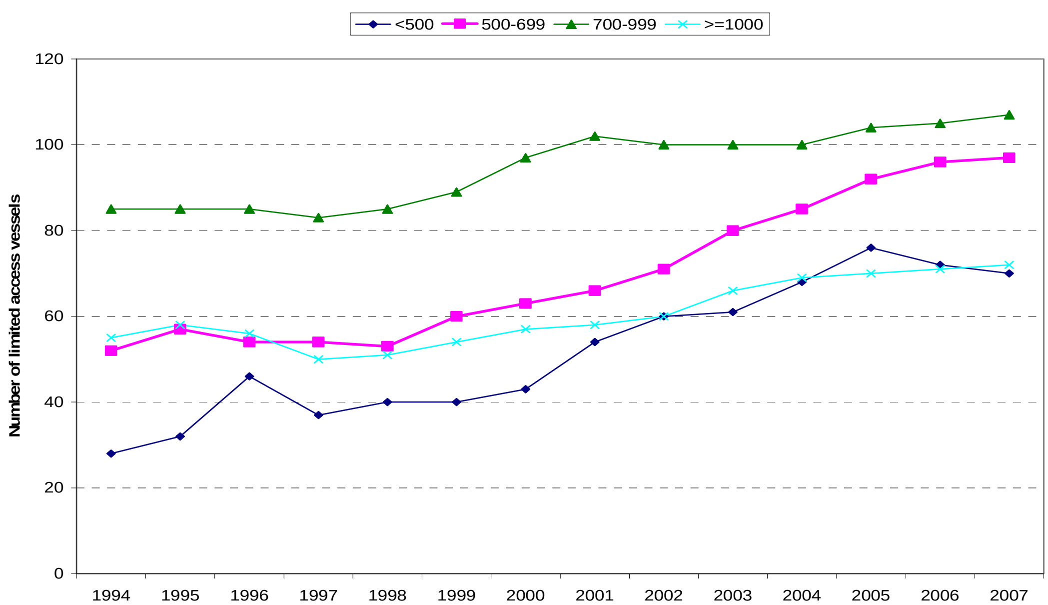


Figure 18 - Number of limited access vessels by horsepower (including part-time and occasional vessels)



The majority of the small dredges had a horsepower of less than 500.

Table 69 - Number of limited access vessels by years active

Number of vessels	Years Active				
FISHYEAR	<5 years	5-9 years	10-13 years	14 years	Grand Total
1994	28	22	40	150	240
1995	22	24	51	150	247
1996	20	24	55	150	249
1997	6	22	53	150	231
1998	1	28	54	150	233
1999	3	35	59	150	247
2000	4	47	66	150	267
2001	4	67	64	150	285
2002	3	79	66	150	298
2003	4	92	66	150	312
2004	27	88	62	150	327
2005	55	86	54	150	345
2006	75	84	46	150	355
2007	84	79	34	150	347

There is a slight difference in the trend for fishing effort weighted by horsepower from the total fleet DAS-used as Figure 20. Average HP, GRT and crew declined slightly from 1994 to 2007 because more small vessels became active in the fishery, reducing marginally the rise of HP weighted DAS-used compared to the total DAS-used in 2007 (Figure 19).

Figure 19 - Average HP, GRT and crew size of limited access vessels

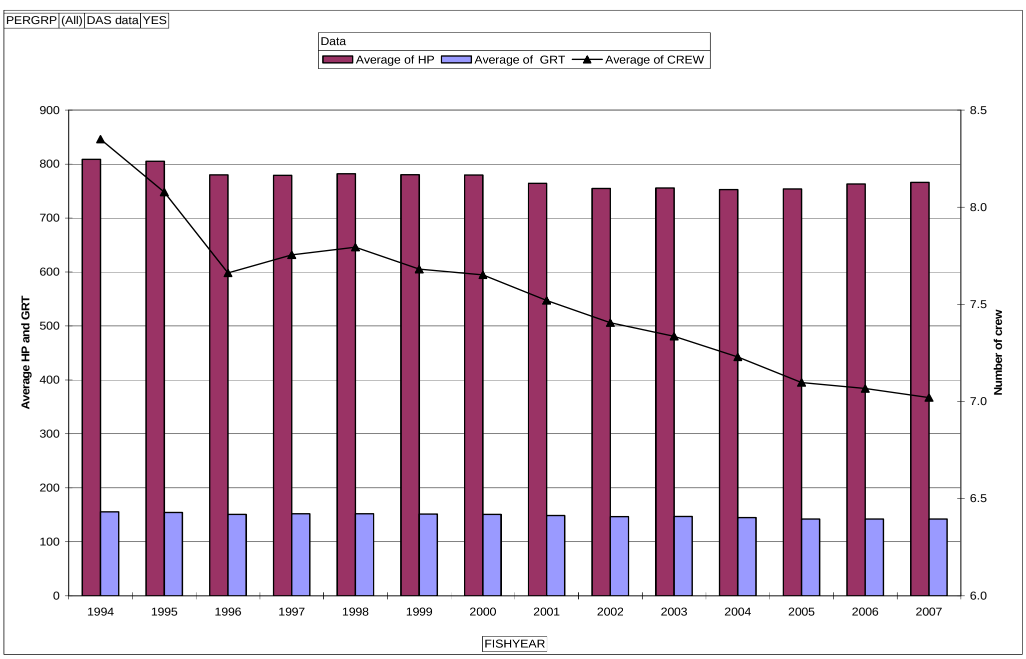
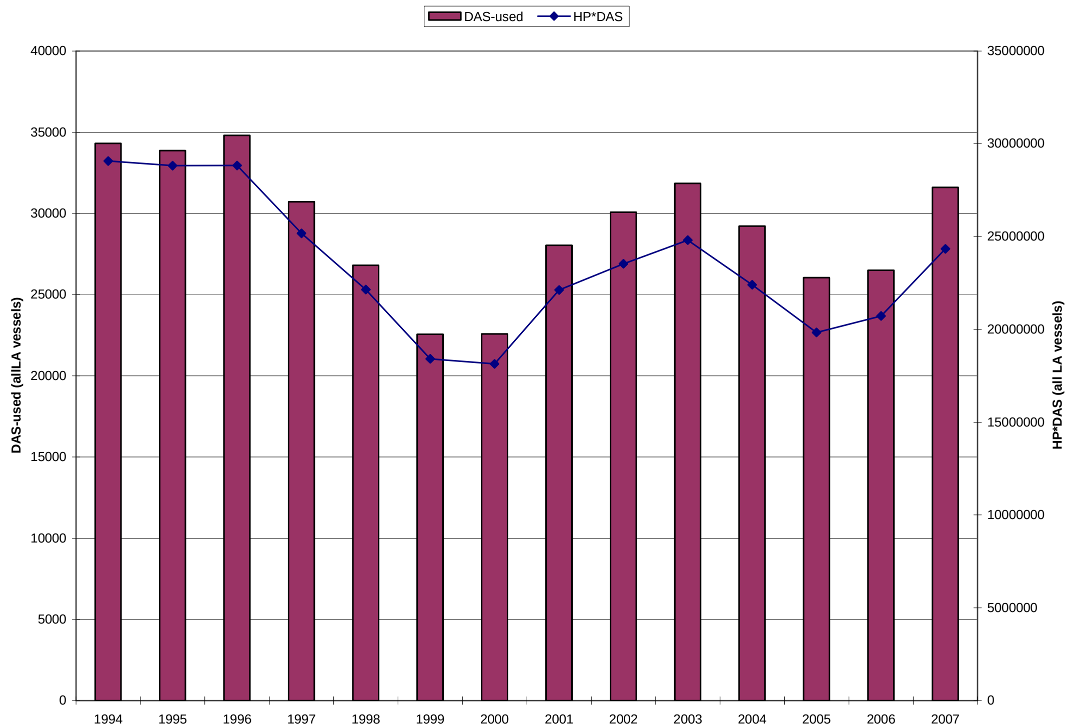


Figure 20 - Trends in fishing effort by limited access vessels



6.6.5.3 Trends in Biomass, LPUE and Participation

The annual average LPUE increased constantly after 1998 as the scallop resource recovered and fishable mean biomass increased from about 750 million in 1998 to over 3500 million in 2006 (Figure 21). Average LPUE for a full-time increased from 540 pounds per DAS in 1994 to over 2000 pounds per day in 2004, but declined afterwards to 1,700 pounds per DAS in 2007 (Table 70). The increased in scallop abundance provided incentive for new limited access vessels to participate in the fishery especially after 1999 fishing year, probably having a negative impact on the LPUE per vessel due to the increased competition for fish although the extent of this impact requires more analysis.

Figure 21 - Fishable biomass, LPUE (annual landings/ DAS) and number of limited access vessels (all vessels)

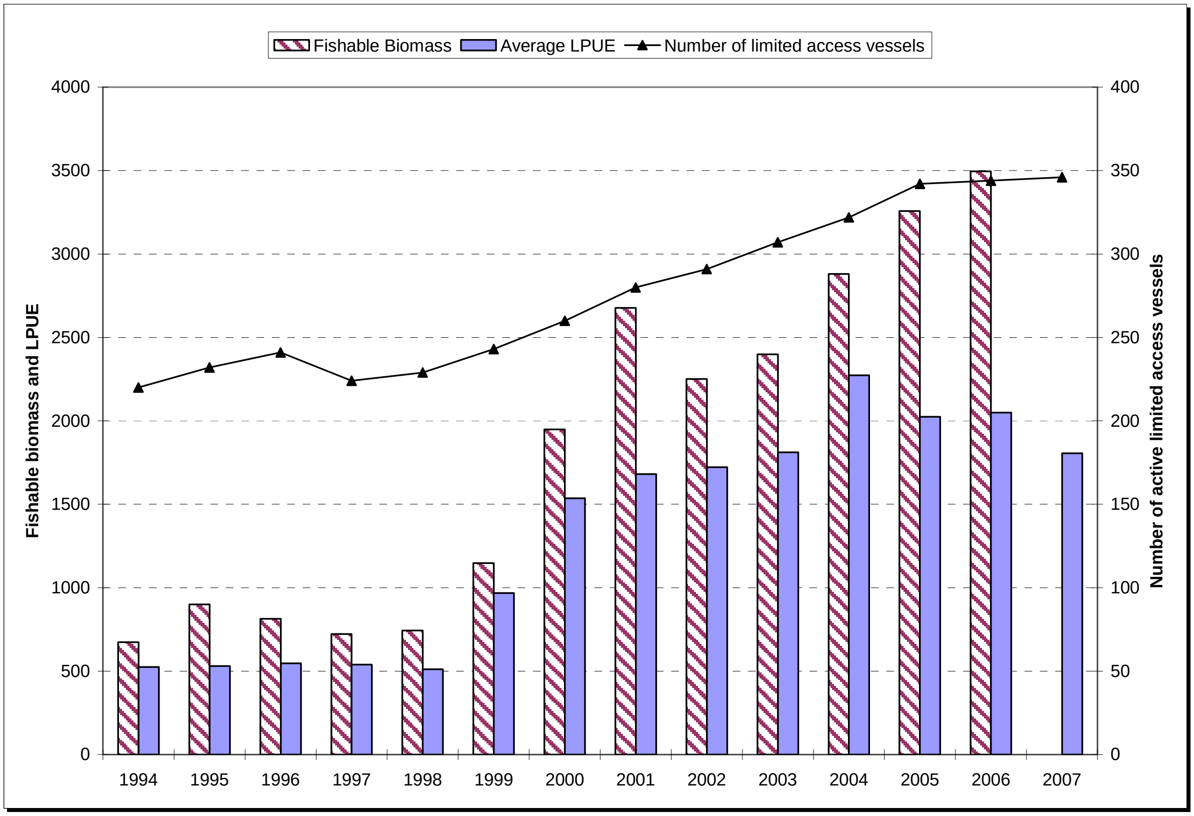


Table 70 - Trends in LPUE for full-time vessels (including small dredge and scallop trawls) and fishable mean abundance

FISHYEAR	FT vessels that landed an average of less than 400 pounds of scallops per DAS as an average per year (Group A)	FT vessels that landed 400 pounds or more scallops per DAS as an average per year (Group B)	Average LPUE per full-time vessel (includes all vessels in Groups A and B)	Average LPUE per full-time vessel that landed 400 pounds or more scallops per DAS (Group B)	Maximum LPUE (Rounded numbers) All FT vessels)	Fishable mean abundance * (Whole stock, all sizes, millions)
1994	87	117	437	543	970	673
1995	57	148	471	540	850	900
1996	65	137	474	549	900	813
1997	107	87	414	537	1500	722
1998	97	103	416	517	750	744
1999	6	200	943	963	1800	1147
2000	Less than 5	219	1487	1504	2700	1948
2001	Less than 5	237	1604	1623	2700	2677
2002	Less than 5	254	1627	1638	3700	2250
2003	Less than 5	269	1691	1713	4700	2399
2004	6	284	2083	2124	4500	2881
2005	Less than 5	304	1856	1866	4700	3258
2006	9	302	1868	1918	4000	3495
2007	Less than 5	307	1693	1714	3800	NA

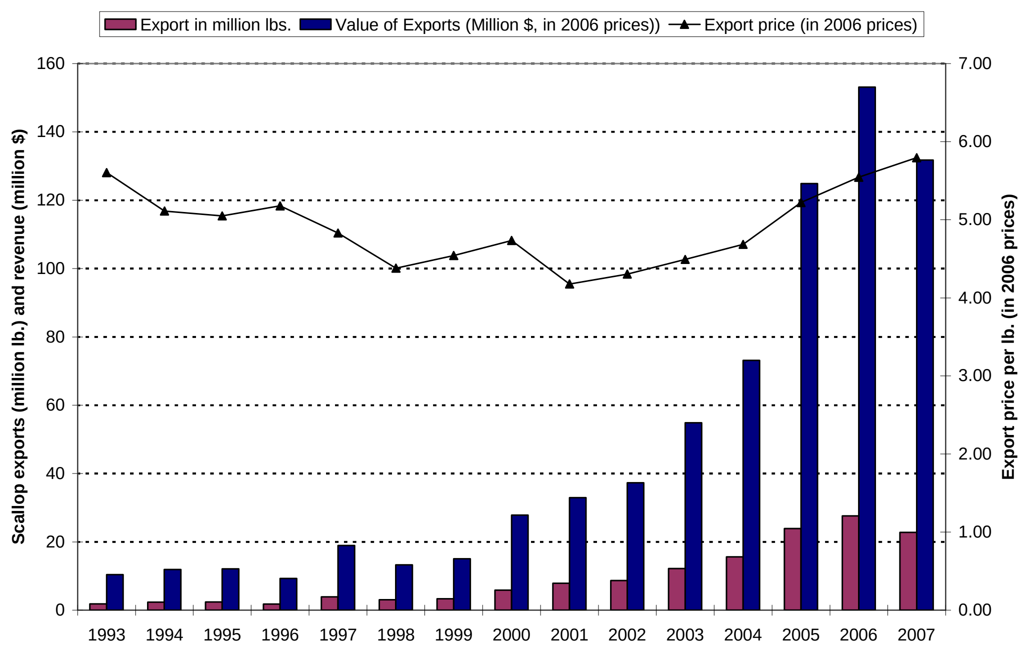
* 45th Stock Assessment Report for Atlantic Sea Scallops (Sept, 2007), Table B5-5, p.183.

6.6.5.4 Trends in foreign trade

6.6.5.4.1 Scallop Exports

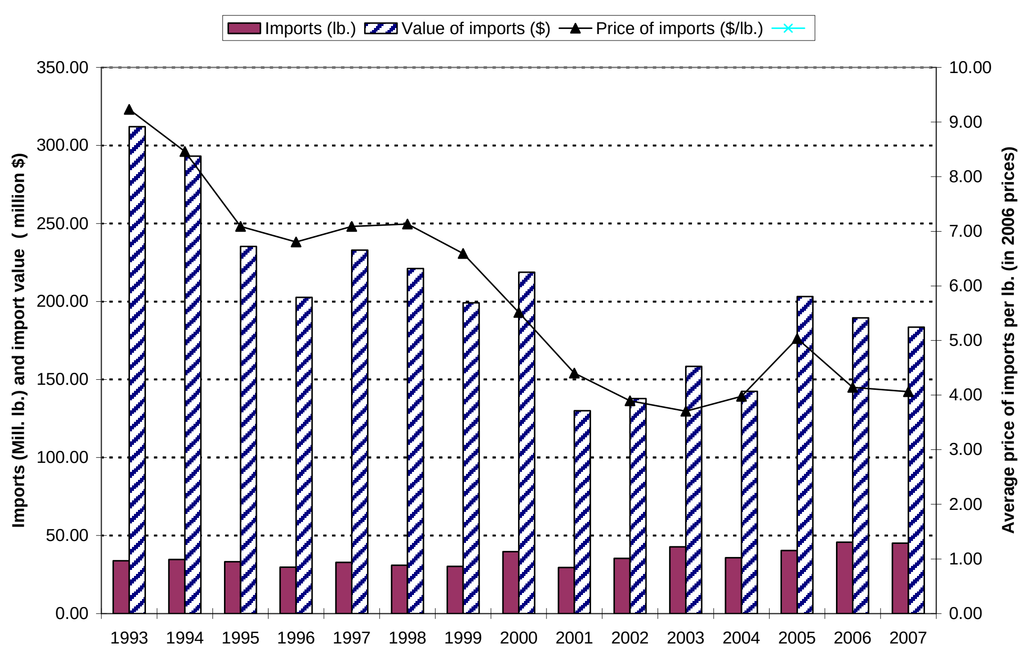
Figure 22 shows exports from NE and Mid-Atlantic ports and includes fresh, frozen and processed scallops. The exports from all other states and areas totaled only about $1 million in 2006 and 2007, and thus was not significant.

Figure 22 - Scallop exports from New England and Mid-Atlantic (by calendar year)



6.6.5.4.2 Imports

Figure 23 - Imports, value of imports and import price of scallops (by calendar year)



6.6.5.4.3 Trends in fishing by gear type

Table 71 through Table 73 describe general category landings by gear type. These tables are generated by VTR data and since all VTR records do not include gear information, the number of vessels in these tables will differ from other tables that summarize general category vessels and landings from dealer data. Primary gear is defined as the gear used to land more than 50% of scallop pounds. Most general category effort is and has been from vessels using scallop dredge and other trawl gear (
Table 71). The number of vessels using scallop trawl gear increased through 2006 but has declined in recent years. In terms of landings, most scallop landings under general category are with dredge gear (Table 2), with significant amounts also landed by scallop trawls and other trawls. Table 73 shows the percent of general category landings by primary gear and year. The percentages of scallop landings with other trawl gear in 2008 and 2009 were the highest they have been since 2001, but were still significantly less than dredge landings.

Table 71 - Number of general category vessels by primary gear and fishing year

FISHING YEAR	DREDGE, OTHER	DREDGE, SCALLOP	MISC	TRAWL, OTHER	TRAWL, SCALLOP
1994	1	33	4	42	1
1995	4	91	5	48	4
1996	7	101	13	49	1
1997	6	118	9	55	*
1998	10	100	8	52	1
1999	10	87	3	61	5
2000	7	78	9	91	3
2001	4	122	7	118	6
2002	3	147	3	104	9
2003	6	155	2	116	17
2004	8	217	10	183	35
2005	26	280	3	183	60
2006	29	366	9	159	65
2007	26	280	4	125	30
2008	9	129	5	66	21
2009	8	117	1	53	22

Table 72 - General category scallop landings by primary gear (pounds)

FISHING YEAR	DREDGE, OTHER	DREDGE, SCALLOP	MISC	TRAWL, OTHER	TRAWL, SCALLOP
1994	111	144,139	260	9,564	2,601
1995	4,812	501,910	1,146	43,585	11,797
1996	1,352	578,884	3,314	19,460	1,644
1997	3,253	682,270	3,465	30,227	*
1998	6,049	334,930	2,443	19,677	3,750
1999	18,322	236,482	599	17,537	3,970
2000	6,446	303,168	1,411	173,827	8,179
2001	91,939	1,254,153	6,518	404,709	28,276
2002	21,888	1,266,144	919	74,686	41,977
2003	22,614	1,590,575	484	171,511	196,376
2004	36,260	2,624,753	2,259	487,620	373,980
2005	198,736	4,934,735	1,441	744,027	892,154
2006	198,400	5,607,142	8,386	418,708	599,508
2007	142,044	4,517,800	724	226,131	395,683
2008	87,186	2,593,870	1,502	528,252	287,362
2009	63,368	1,940,047	400	574,555	211,598

Table 73 - Percentage of general category scallop landings by primary gear

FISHING YEAR	DREDGE, OTHER	DREDGE, SCALLOP	MISC	TRAWL, OTHER	TRAWL, SCALLOP
1994	0.07%	92.00%	0.17%	6.10%	1.66%
1995	0.85%	89.11%	0.20%	7.74%	2.09%
1996	0.22%	95.74%	0.55%	3.22%	0.27%
1997	0.45%	94.86%	0.48%	4.20%	*
1998	1.65%	91.30%	0.67%	5.36%	1.02%
1999	6.62%	85.40%	0.22%	6.33%	1.43%
2000	1.31%	61.49%	0.29%	35.26%	1.66%
2001	5.15%	70.24%	0.37%	22.67%	1.58%
2002	1.56%	90.08%	0.07%	5.31%	2.99%
2003	1.14%	80.27%	0.02%	8.66%	9.91%
2004	1.03%	74.46%	0.06%	13.83%	10.61%
2005	2.94%	72.88%	0.02%	10.99%	13.18%
2006	2.90%	82.07%	0.12%	6.13%	8.77%
2007	2.69%	85.53%	0.01%	4.28%	7.49%
2008	2.49%	74.15%	0.04%	15.10%	8.21%
2009	2.27%	69.54%	0.01%	20.59%	7.58%

6.6.5.4.4 Trends in scallop landings by port

The landed value of scallops by port landing fluctuated from 1994 through 1998 for many ports. During the past five years, six ports brought in the most landed value: New Bedford, MA; Cape May, NJ; Newport News, VA; Barnegat Light/Long Beach, NJ, Seaford, VA, and Hampton, VA (Table 74). In addition to bringing in the most landed value, in 1994 scallop landings represented more than 30% of the total landed value for New Bedford, MA and Cape May, NJ, and more than 65% of the total landed value for Newport News and Hampton, VA (Table 75). This has increased in 2008 to 74% and 84% for New Bedford, MA and Cape May, NJ, respectively, and 93% and 84% for Newport News and Hampton, VA, respectively.

Landed value has increased steadily from 1999-2008; but, some leveling off is apparent in recent years. In the most recent two years of data (2007-2008), 43% of ports saw a decrease in the percentage of landed scallop value to total landed value (Table 73). However, many of these decreases are very small, on the order of 1-3%.

Between 2003 and 2005, 10 ports increased their landed value for scallops, potentially from an increase in general category landings. The average landed value has increased from $2 million in 1994 to a peak of $12 million in 2005. In 2006-2008, the average landed value has hovered between $9 and $10 million.

Table 74 - Landed value of scallops (in thousands of dollars) by port of landing, FY 1994-2008.

* Includes only ports of landings with landed value of scallops in excess of $100,000 during FY2008. X = confidential data, with landings that are greater than 100,000 but less than 1.25 million, X* = less than 70,000. Data run August 7, 2009, based on dealer weighout data YTD.

Port and County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
New Bedford MA (Bristol County)	30981	36553	48436	45514	34687	70554	88491	80357	96011	104664	150121	206784	210517	211847	172603
Cape May NJ (Cape May County)	9360	8874	8656	6945	5588	9765	14158	18626	20237	28530	46530	51421	21619	45517	55522
Newport News VA (Newport News City)	9289	11917	13457	11173	11275	15207	23092	25535	30494	37361	48424	39467	22708	33363	37328
Barnegat Light/Long Beach NJ (Ocean County)	2653	2727	3007	3105	2693	3941	6733	6753	8071	10021	15641	21367	16651	16694	17275
Seaford VA (York County)	0	0	0	5553	4543	6540	11168	10465	11841	13043	18572	16364	11701	15340	14401
Hampton VA (Hampton City)	12425	7863	6346	3258	4557	5084	8289	9195	13803	19012	19978	14147	9180	15513	13620
Fairhaven MA (Bristol County)	0	0	0	0	0	0	0	0	0	0	0	5280	10103	8892	9166
Point Pleasant NJ (Ocean County)	315	532	1401	2207	1590	1854	3784	3197	3530	3973	3523	8574	7544	8751	8119
Stonington CT (New London County)	0	0	232	2573	2717	3302	3459	4944	5669	7463	10363	7402	4997	7680	5243
Wildwood NJ (Cape May County)	7	14	X*	0	X*	0	120	1246	2056	2194	3557	3942	2113	3690	3836
Ocean City MD (Worcester County)	11	24	43	5	15	25	118	79	99	212	174	4871	5631	2815	3504
Point Lookout NY (Nassau County)	0	0	0	0	0	0	0	0	0	0	21	33	X*	1075	3001
Avalon NJ (Cape May County)	0	0	0	0	0	0	0	0	0	0	0	X	1563	3468	2808
New London CT (New London County)	0	0	0	0	0	843	817	943	886	1026	1203	1736	1465	X	2588
Chatham MA (Barnstable County)	0	0	X*	0	0	0	X*	588	117	409	1927	2996	3154	2056	1715
Atlantic City NJ (Atlantic County)	15	1	0	0	1	0	0	X*	0	0	382	2308	2048	2706	1518
Other Connecticut (Not-Specified County)	700	1665	0	0	0	0	0	0	0	0	0	0	0	96	1421
Point Judith RI (Washington County)	1	58	4	7	X*	242	734	596	83	274	622	4638	7358	2835	1371
Montauk NY (Suffolk County)	X*	X*	X*	X*	0	7	6	8	0	1	435	1367	1878	2187	1346
Engelhard NC (Hyde County)	0	0	0	0	0	X*	X*	X*	0	140	22	124	311	709	817
Newport RI (Newport County)	23	229	101	784	534	447	700	X*	3	X*	1382	8412	13070	6031	747
Hampton Bays NY (Suffolk County)	X*	5	5	22	6	53	426	454	94	155	533	1588	846	422	574
Belford NJ (Monmouth County)	X*	X*	X*	21	X*	3	2	X*	X*	X*	X*	33	X*	16	548
Other Atlantic NJ (Atlantic County)	387	0	0	0	0	0	0	0	0	0	0	134	874	1017	542
Chincoteague VA (Accomack County)	2	0	X*	0	X*	7	210	803	1115	1957	4058	11892	7253	1153	489
New Haven CT (New Haven County)	0	0	X*	0	X*	0	0	0	0	0	0	0	0	0	X
Gloucester MA (Essex County)	X*	X*	232	357	104	161	1014	1543	783	557	682	1217	890	487	352
Sandwich MA (Barnstable County)	23	37	284	128	243	213	157	218	249	266	136	243	403	707	337
Provincetown MA (Barnstable County)	45	24	92	97	114	57	120	2130	540	648	637	1684	1046	595	320
Other Cape May NJ (Cape May County)	0	0	0	0	0	0	0	0	X*	0	0	X*	825	104	X
Indian River DE (Sussex County)	0	0	0	0	0	0	0	0	0	0	0	X*	114	1	245
Wellfleet MA (Barnstable County)	0	X*	X*	70	X*	23	X*	66	32	112	47	284	64	X*	244

Other Monmouth NJ(Monmouth County)	0	0	0	0	0	0	0	0	0	0	0	X*	X	X	X
Hyannisport MA (Barnstable County)	0	0	0	0	0	0	0	0	0	0	30	648	473	262	222
Addison ME (Washington County)	0	0	0	X	X	0	0	0	X	0	X	X	49	268	151
Nantucket MA (Nantucket County)	5	X*	8	X*	1	0	X	X*	X*	2	58	282	187	195	129
Harwich Port MA (Barnstable County)	0	0	0	0	0	0	0	590	110	318	462	770	115	171	X
Wanchese NC (Dare County)	0	0	0	X*	0	31	64	1350	1023	262	382	75	127	X*	X
Shinnecock Hills NY (Suffolk County)	0	0	0	0	0	0	0	0	0	0	X*	317	210	44	118
Bucks Harbor ME (Washington County)	0	0	0	0	0	0	0	0	0	3	0	0	X	0	111
Barnstable MA (Barnstable County)	0	0	0	0	0	0	0	0	0	0	31	184	607	326	108
Falmouth MA (Barnstable County)	0	0	0	0	0	0	X*	0	X*	X*	X*	71	36	235	X

Table 75 - Percentage of landed value of scallops to total landed value by port of landing, FY 1994-2006

* Includes only ports of landings with landed value of scallops in excess of $100,000 during FY2008. Data run August 2, 2007, based on dealer weighout data YTD.

Port Name	County	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NEW BEDFORD	BRISTOL	39	41	45	44	36	53	57	53	58	58	70	75	77	76	74
CAPE MAY	CAPE MAY	33	33	35	29	23	44	59	68	69	76	75	81	71	80	80
NEWPORT NEWS	NEWPORT NEWS (CITY)	67	71	76	73	73	79	86	84	89	92	92	94	92	90	93
BARNEGAT LIGHT/LONG BEACH	OCEAN	28	29	32	30	26	30	47	47	57	60	73	78	73	69	75
SEAFORD	YORK	.	.	.	95	94	98	99	100	100	100	100	100	99	99	100
HAMPTON	HAMPTON (CITY)	71	66	63	47	55	61	73	75	82	83	76	74	74	78	84
FAIRHAVEN	BRISTOL	.	.	.	.	.	0	0	0	0	0	0	65	90	90	87
POINT PLEASANT	OCEAN	2	5	10	13	10	10	21	17	18	18	19	39	34	38	40
STONINGTON	NEW LONDON	.	.	24	39	38	35	36	52	67	77	82	71	66	78	68
WILDWOOD	CAPE MAY	0	0	0	0	0	0	3	21	32	32	51	82	75	90	96
OCEAN CITY	WORCESTER	0	0	1	0	0	0	2	1	1	3	0	42	45	26	35
POINT LOOKOUT	NASSAU	.	.	.	.	.	.	.	0	0	0	3	4	0	58	80
AVALON	CAPE MAY	.	.	.	.	.	.	.	.	.	.	0	99	99	98	98
NEW LONDON	NEW LONDON	.	.	0	0	0	21	32	24	21	22	21	29	34	39	73
CHATHAM	BARNSTABLE	0	0	0	0	0	0	1	5	1	4	18	19	19	14	11
ATLANTIC CITY	ATLANTIC	0	0	0	0	0	0	0	0	0	0	2	12	8	10	8
OTHER CONNECTICUT	NOT-SPECIFIED	1	4	0	0	0	0	0	0	0	0	0	0	0	24	46
POINT JUDITH	WASHINGTON	0	0	0	0	0	0	2	2	0	1	2	12	16	8	4
MONTAUK	SUFFOLK	0	0	0	0	0	0	0	0	0	0	3	9	11	12	9
ENGELHARD	HYDE	.	.	0	0	0	0	0	2	0	5	1	5	8	10	12
NEWPORT	NEWPORT	0	2	1	10	7	5	8	0	0	0	16	59	64	49	12
HAMPTON BAYS	SUFFOLK	0	0	0	0	0	1	4	5	1	2	8	23	12	7	12
BELFORD	MONMOUTH	0	0	0	1	0	0	0	0	0	0	0	1	2	1	17
OTHER ATLANTIC	ATLANTIC	12	0	0	0	0	0	0	0	0	0	0	6	35	38	27
CHINCOTEAGUE	ACCOMACK	0	0	0	0	0	0	10	33	39	47	54	78	75	27	14
NEW HAVEN	NEW HAVEN	.	.	0	0	0	0	0	0	0	0	0	0	0	0	85
GLOUCESTER	ESSEX	0	0	1	1	0	1	2	4	2	1	2	2	2	1	1
SANDWICH	BARNSTABLE	1	1	8	3	9	6	3	4	4	4	2	4	9	20	11
PROVINCETOWN	BARNSTABLE	2	1	4	4	4	2	3	38	13	19	18	35	28	17	10
OTHER CAPE MAY	CAPE MAY	0	0	0	0	0	0	0	0	1	0	0	1	35	8	22
INDIAN RIVER	SUSSEX	.	.	0	0	0	0	0	0	0	0	0	11	23	0	47
WELLFLEET	BARNSTABLE	.	0	16	23	35	31	7	34	11	25	7	9	2	4	7
OTHER MONMOUTH	MONMOUTH	0	0	0	0	0	0	0	0	0	0	0	1	2	46	4
HYANNISPORT	BARNSTABLE	.	.	.	.	.	.	.	.	.	.	9	19	20	10	9
ADDISON	WASHINGTON	.	.	.	.	.	0	0	0	0	0	0	0	1	5	4
NANTUCKET	NANTUCKET	8	1	3	1	1	0	15	0	0	0	9	19	12	9	9
HARWICH PORT	BARNSTABLE	0	0	0	0	0	0	0	9	2	14	19	25	6	14	10

WANCHESE	DARE	.	.	0	1	0	0	0	13	11	3	3	1	1	0	1
SHINNECOCK HILLS	SUFFOLK	0	0	0	0	0	0	0	0	0	0	4	45	31	6	15
BUCKS HARBOR	WASHINGTON	0	0	0	0	0	0	0	0	0	1	0	0	42	0	3
BARNSTABLE	BARNSTABLE	.	.	0	0	0	0	0	0	0	0	2	11	29	19	5
FALMOUTH	BARNSTABLE	0	0	0	0	0	0	0	0	17	9	0	7	3	14	6

Table 76 - Landed Value of scallops, linked to Vessel Homeport, ranked by fishing year 2008.

Table only includes ports with either more than 1M in 2008 landed value, or more than 250K in landed value with at least 10% port total scallops. X = confidential, less than 1M; XX = confidential, more than 1M. Data run, August 9, 2009.

Port	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NEW BEDFORD	28300	32429	39317	31568	25804	44363	59779	65845	79089	88962	126049	159634	145917	156801	145392
CAPE MAY	6979	7453	7528	7957	5876	10546	16725	17891	23178	30267	46347	63443	59236	72497	62532
NEWPORT NEWS	1840	2250	2547	3263	3495	9017	12438	14089	16328	16788	22516	24306	20803	21774	18929
BARNEGAT LIGHT	3041	3370	3297	2821	2335	4406	6676	6978	7811	9853	15276	19351	15873	16626	16503
NORFOLK	14803	15818	16234	14093	10970	14765	18015	14287	16563	17464	20074	13893	11111	12474	11390
NEW BERN	X	X	X	X	837	2322	2650	3292	4235	6431	7885	7747	8314	12106	10785
WANCHESE	46	14	3	1	485	1	816	2769	3378	4401	5707	6652	4990	7053	6559
NEW LONDON	0	0	0	0	0	0	X	0	0	X	X	2296	4389	3131	5799
FAIRHAVEN	2708	3245	4453	4318	3720	6776	11794	6628	7133	7214	9021	10669	8406	7503	5415
POINT PLEASANT	953	977	1179	1504	1016	1386	2232	2374	2588	2938	3896	6835	6441	5532	5043
LOWLAND	6	120	445	0	X	963	1466	1786	2176	2897	3834	6114	4439	4579	4692
SEAFORD	X	X	X	0	0	0	0	X	2399	3452	3874	4551	2693	5540	4603
STONINGTON	0	1	0	536	73	0	X	698	1471	852	1270	3	59	464	4337
HAMPTON	4113	4413	4001	3014	2602	3704	4998	4103	4318	3742	6815	3576	5424	5213	4030
ATLANTIC CITY	X	X	X	X	X	0	X	X	0	2	96	3657	3484	3945	3154
ORIENTAL	X	X	174	X	890	1627	1776	1260	2059	3688	4397	7161	4572	4333	3151
POINT PLEASANT BEACH	X	0	0	0	0	X	X	X	X	X	456	1147	720	1589	2725
CAPE CANAVERAL	X	X	X	X	X	X	X	X	XX	1673	2380	3651	2574	2260	2441
MONTAUK	X	0	X	1	0	3	65	19	6	X	116	1206	386	2535	2386
BEAUFORT	42	X	X	X	0	X	X	244	256	67	289	1953	855	1473	2240
BARNSTABLE	2227	1968	1368	650	396	384	891	939	970	798	1152	2017	2649	2476	2164
CARROLLTON	X	X	X	X	X	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
WILDWOOD	4	5	149	X	X	X	805	1001	843	792	1855	2464	1559	1952	1776
GLOUCESTER	171	11	317	372	251	986	636	597	757	846	1681	2262	1654	1387	1449
BAYBORO	X	X	X	X	X	X	X	671	998	1512	2141	809	1235	1643	XX
BEDFORD	X	X	X	X	X	X	X	XX	X	XX	XX	XX	XX	XX	XX
BOSTON	265	334	454	454	162	449	512	706	880	1021	639	XX	1037	719	XX
CHATHAM	0	0	0	0	0	X	0	296	42	273	478	1285	1557	1723	1120
MANAHAWKIN	0	0	0	0	0	0	0	0	0	0	0	XX	XX	XX	XX
SOUTHWEST HARBOR	168	405	521	482	282	763	1086	590	529	674	X	XX	XX	XX	XX
TREMONT	X	X	X	338	226	X	X	X	554	787	1051	XX	XX	XX	X
AURORA	X	X	X	X	X	X	X	X	X	XX	XX	XX	XX	XX	X
SUFFOLK	0	0	0	0	0	0	0	0	0	0	0	0	0	X	X
PLYMOUTH	X	X	X	66	12	X	X	X	126	X	253	1568	845	1678	960
NEWPORT	X	X	X	X	X	X	X	X	X	X	X	X	891	X	X
OCEAN CITY	0	0	0	0	0	0	0	0	X	0	X	X	X	X	X
KEY WEST	X	0	0	X	0	0	0	0	X	X	X	X	X	X	X
JACKSONVILLE	X	0	0	X	X	X	X	X	X	0	X	1414	XX	X	X
TILGHMAN ISLAND	0	0	0	0	0	0	0	0	0	0	0	590	859	483	800
OWLS HEAD	X	235	87	X	X	X	X	516	395	371	347	682	487	239	745
OCEAN CITY	X	11	1	X	0	X	7	23	27	14	583	1906	1887	737	725
HAMPTON BAYS	3	4	19	7	5	7	320	307	42	80	398	1235	763	379	509
WESTPORT	0	0	0	0	0	0	0	0	0	0	30	420	491	555	421
SWAN QUARTER	0	0	X	X	X	X	827	X	X	749	1509	2775	941	444	404
PROVINCETOWN	15	27	72	86	36	72	96	1867	352	351	391	1495	932	811	381
TOMS RIVER	0	0	0	0	0	0	0	X	X	X	X	0	X	X	X
NANTICOKE	0	0	0	0	0	0	0	0	0	0	0	X	X	X	X
POINT LOOKOUT	0	0	X	X	0	X	0	0	0	0	19	X	X	X	X
GLOUCESTER POINT	0	0	0	0	0	0	0	0	0	0	0	0	X	X	X
GALLOWAY	0	0	0	0	0	0	0	0	0	0	0	0	0	X	X

SCRANTON	0	0	0	0	0	0	0	0	0	X	X	X	X	X	X
BELMAR	X	0	0	0	0	0	0	0	0	0	0	187	250	X	X
HULL	0	0	0	0	0	0	0	X	X	X	X	X	X	X	X
NEW YORK	0	0	0	X	0	X	X	X	X	X	X	0	X	0	X

The largest numbers of permitted limited access scallop vessels currently are in the ports of New Bedford, MA and Cape May, NJ, which represent 37% and 19% of the total, respectively (Table 77). Of the 348 permitted limited access vessels in 2009, 203 originate from New Bedford, MA and Cape May, NJ. Although the number of permitted limited access vessels has only increased from 308 in 1994 to a peak of 380 in 2005 and New Bedford has always had the largest number of permitted limited access vessels, the port with the next greatest number of contributors shifted from Norfolk, VA (18% in 1994 to 3% in 2009) to Cape May, NJ (9% in 1994 to 19% in 2009).

In addition to having the greatest number of permitted limited access scallop vessels, New Bedford, MA also has the greatest number of general category scallop vessels. Cape May, NJ, Barnegat Light, NJ, and Gloucester, MA also have high numbers of general category scallop vessels. Generally, ports that had a higher number of general category scallop vessels from 1994-2004, such as New Bedford, Gloucester, and Chatham, have seen a significant decrease in these vessels in recent years. Increases have been seen in ports that originally had no to very few permitted general category scallop vessels, such as Belhaven and Engelhard, NC (Table 77). Although the largest increases have been from many ports in NC, they have increased from 1 or no permitted general category scallop vessels to only about 6 or 7, which results in a 600-700% increase. Regardless of this increase, these ports only had a landed value for scallops of $311,000 or less. Other ports that saw an increase of 300% in general category vessels, such as Chincoteague, VA and Barnegat Light, NJ, had a landed value of $7.3 million and $16.9 million, respectively (Table 74). Although some ports, such as New Bedford and Gloucester have experienced a decline in the number of general category scallop vessels, the simultaneous increase in permitted limited access boats has aided to increase the landed value of scallops in those ports to $202.5 million and $812,000, respectively. As Table 79 shows, however, the general category fleet is not homogeneous, but varies over space and time, with some ports showing a general category fleet that mirrors limited access vessels in size (for example Atlantic City NJ), and others showing the more traditionally smaller-scale vessels (such as Fairhaven MA). Thus impacts to the general category fishery as a whole can be experienced differently in different ports.

Table 77 - Permitted limited access scallop vessels, by homeport, 1994-2009.

Homeport	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
New Bedford, MA (Bristol county)	94	91	79	75	73	78	81	96	105	110	115	130	136	136	137	136
Cape May, NJ (Cape May county)	33	31	31	33	33	34	38	39	45	53	58	72	71	75	70	67
Newport News, VA (Newport News City)	8	9	10	10	12	17	19	21	21	21	22	23	19	19	18	18
Barnegat Light, NJ (Ocean county)	9	9	9	9	8	8	10	10	9	11	13	12	11	11	11	11
New Bern, NC (Craven county)	1	2	2	4	4	6	6	8	8	8	8	13	13	14	11	11
Norfolk, VA (Norfolk City)	65	67	63	58	51	42	35	27	27	27	22	13	12	11	11	11
Wanchese, NC (Dare county)	4	3	2	2	2	1	4	8	7	7	6	6	8	8	8	8
Lowland, NC (Pamlico county)	6	6	7	6	6	8	7	7	7	8	9	8	8	8	7	7
Hampton, VA (Hampton City)	15	15	11	11	8	7	6	6	6	6	7	5	7	7	7	6
Seaford, VA (York county)	1	1	1	0	0	0	0	2	3	4	4	5	6	5	5	6
Beaufort, NC (Carteret county)	6	6	3	2	1	1	1	1	1	0	0	0	0	1	2	5
Fairhaven, MA (Bristol county)	12	13	10	10	13	12	15	11	9	9	8	9	8	6	5	5
New London, CT (New London county)	0	0	0	0	0	1	1	1	1	1	1	3	5	5	5	5
Point Pleasant, NJ (Ocean county)	6	6	5	5	4	4	4	4	4	4	4	4	4	4	6	5
Oriental, NC (Pamlico county)	2	2	3	2	4	5	4	5	5	7	9	9	14	11	7	4
Stonington, CT (New London county)	3	3	5	6	6	4	5	7	7	8	8	4	4	5	4	4
Atlantic City, NJ (Atlantic county)	0	0	0	0	0	0	0	0	0	0	0	1	2	2	3	3
Montauk, NY (Sufflolk county)	1	0	0	0	0	0	0	0	0	0	0	1	0	2	3	3
Narragansett, RI (South county)	2	2	3	3	3	4	4	3	3	3	2	3	4	4	3	3
Barnstable, MA (Barnstable county)	12	9	9	4	2	1	1	1	1	1	2	2	2	2	2	2
Bayboro, NC (Pamlico county)	1	1	1	3	1	2	2	2	4	3	3	2	3	2	2	2
Cape Canaveral, FL (Brevard county)	3	4	4	3	3	1	2	3	2	2	2	2	2	2	2	2
Carrollton, VA (Isle Of Wight county)	2	3	2	1	2	2	3	2	2	2	2	2	2	2	2	2
Owls Head, ME (Knox county)	2	3	2	2	2	2	3	3	3	2	2	2	2	2	2	2
Plymouth, MA (Plymouth county)	2	0	0	0	0	0	0	0	0	0	1	2	3	3	2	2
Swan Quarter, NC (Hyde county)	1	1	1	1	1	2	2	2	3	3	3	3	1	1	2	2
Wildwood, NJ (Cape May county)	5	5	4	3	3	2	2	2	2	2	2	2	4	2	2	2
Bedford, MA (Middlesex county)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Boston, MA (Suffolk county)	1	1	2	3	3	2	2	2	2	2	1	1	1	1	1	1
Essex, CT (Middlesex county)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Jacksonville, FL (Duval county)	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1
Key West, FL (Monroe county)	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Manahawkin, NJ (Ocean county)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Newport, NC (Carteret county)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ocean City, MD (Worcester county)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Point Pleasant Beach, NJ (Ocean county)	0	0	0	0	0	1	1	1	1	1	1	1	2	1	2	1
Poquoson, VA (York county)	0	0	0	0	0	2	2	1	1	2	2	2	2	2	1	1
Southwest Harbor, ME (Hancock county)	6	3	4	3	2	2	2	2	2	2	1	1	1	1	1	1
Suffolk, VA (Suffolk (City) county)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Tremont, ME (Hancock county)	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Westport, MA (Bristol county)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 78 - Permitted general category scallop vessels, by homeport, 2005-2009. All ports that had at least 1 GC permit in 2009 are included.

Port	County	State	2005	2006	2007	2008	2009
NEW BEDFORD	PLYMOUTH	MA	86	88	83	67	72
CAPE MAY	SUFFOLK	MA	30	48	54	25	28
BARNEGAT LIGHT	HANCOCK	ME	29	30	31	28	27
GLOUCESTER	HANCOCK	ME	38	49	55	23	26
POINT PLEASANT	WASHINGTON	ME	17	22	24	14	15
PROVINCETOWN	PLYMOUTH	MA	14	16	15	11	11
HAMPTON BAYS	BARNSTABLE	MA	13	21	21	7	10
NEW BERN	PLYMOUTH	MA	5	6	5	5	10
NARRAGANSETT	DARE	NC	37	44	50	5	8
CHATHAM	OCEAN	NJ	23	27	29	7	7
STONINGTON	BRISTOL	MA	16	19	15	5	7
BELHAVEN	SAGADAHOC	ME	12	9	8	5	6
SEABROOK	CARTERET	NC	2	4	9	4	6
SOUTH BRISTOL	WICOMICO	MD	6	8	7	6	6
BEAUFORT	BEAUFORT	NC	14	14	14	4	5
ENGELHARD	CRAVEN	NC	7	8	7	5	5
LOWLAND	GLOUCESTER	VA	5	5	5	2	5
OCEAN CITY	SUSSEX	DE	12	17	15	4	5
PORTLAND	CARTERET	NC	24	22	19	6	5
RYE	DUVAL	FL	3	6	8	3	5
BOSTON	MONMOUTH	NJ	13	11	13	3	4
HAMPTON	SUFFOLK	NY	7	7	6	4	4
MONTAUK	ROCKINGHAM	NH	17	17	20	5	4
NEWBURYPORT	NEWPORT	RI	6	7	5	4	4
POINT PLEASANT BEACH	WASHINGTON	ME	3	3	2	5	4
PORT CLYDE-TENANTS HARBOR	DARE	NC	2	2	6	4	4
PORTSMOUTH	CARTERET	NC	12	12	12	6	4
ROCKPORT	CUMBERLAND	NJ	3	5	5	4	4
SCITUATE	SUFFOLK	NY	8	7	8	4	4
NEW YORK	DUVAL	FL	2	3	3	2	3
NORFOLK	YORK	ME	7	7	5	3	3
TILGHMAN ISLAND	NEW LONDON	CT	7	10	9	3	3
WANCHESE	NEWPORT	RI	14	13	10	4	3
WILDWOOD	CAPE MAY	NJ	5	5	6	4	3
WOODS HOLE	NASSAU	NY	3	4	5	5	3
ATLANTIC CITY	ATLANTIC	NJ	20	22	17	2	2
FRIENDSHIP	WASHINGTON	ME	2	3	3	3	2
KENNEBUNKPORT	ATLANTIC	NJ	0	0	0	2	2
MARSHFIELD	HAMPTON (CITY)	VA	2	3	3	2	2
MILLVILLE	SUFFOLK	NY	1	3	4	2	2
MOUNT DESERT	CUMBERLAND	ME	1	1	1	3	2
NEW LONDON	SUFFOLK	NY	6	8	6	2	2
NEWPORT NEWS	YORK	ME	6	5	6	2	2
SACO	WASHINGTON	ME	0	1	2	2	2
SALISBURY	SUSSEX	NJ	1	2	3	2	2
SHALLOTTE	CHARLESTON	SC	2	2	2	2	2
STEUBEN	MONMOUTH	NJ	2	3	3	2	2
SWAN QUARTER	CRAVEN	NC	5	9	7	2	2
WELLFLEET	NEWPORT NEWS (CIT	VA	5	4	5	2	2

Port	County	State	2005	2006	2007	2008	2009
WILMINGTON	CAPE MAY	NJ	6	6	5	2	2
YORK HARBOR	NEW CASTLE	DE	0	1	1	2	2
BARNSTABLE	OCEAN	NJ	9	9	9	1	1
BATH	OCEAN	NJ	2	3	3	1	1
BELMAR	PAMLICO	NC	2	2	1	1	1
BREMEN	BEAUFORT	NC	2	4	3	1	1
CAPE CANAVERAL	SUFFOLK	MA	7	6	5	2	1
CAPE MAY COURT HOUSE	BARNSTABLE	MA	1	1	1	1	1
CHEBEAGUE ISLAND	FAIRFIELD	CT	0	2	0	1	1
CUSHING	CAPE MAY	NJ	2	2	2	1	1
CUTLER	CAPE MAY	NJ	2	3	5	2	1
EAST CENTRAL WASHINGTON	CUMBERLAND	ME	1	1	1	1	1
EASTPORT	MOBILE	AL	0	2	2	1	1
FAIRHAVEN	KNOX	ME	6	6	4	2	1
GLOUCESTER COURTHOUSE	HANCOCK	ME	0	0	0	1	1
GREEN HARBOR-CEDAR CREST	WICOMICO	MD	0	2	4	1	1
HAMPTON FALLS	WASHINGTON	ME	1	1	1	1	1
HARPSWELL	DUKES	MA	8	14	16	1	1
HARWICH PORT	HYDE	NC	5	8	6	0	1
HULL	BRISTOL	MA	1	1	1	1	1
KITTERY	SAGADAHOC	ME	5	6	6	1	1
LEWES	CARTERET	NC	3	3	3	1	1
LUBEC	PAMLICO	NC	9	7	4	2	1
LYNN	PLYMOUTH	MA	0	0	0	1	1
MACHIASPORT	SUFFOLK	NY	6	6	7	3	1
MANAHAWKIN	SUFFOLK	NY	0	0	0	1	1
MARSHALLBERG	ROCKINGHAM	NH	1	1	2	1	1
MONTVILLE	HANCOCK	ME	0	0	0	1	1
MOREHEAD CITY	CUMBERLAND	ME	1	1	1	1	1
NANTICOKE	BARNSTABLE	MA	1	2	2	1	1
NASSAWADOX	MONMOUTH	NJ	1	2	1	1	1
NEPTUNE	PAMLICO	NC	1	1	1	1	1
NEWPORT	WASHINGTON	ME	12	13	12	1	1
OCEAN BLUFF-BRANT ROCK	SUSSEX	DE	2	1	2	1	1
ORIENTAL	CUMBERLAND	ME	5	13	8	1	1
OWLS HEAD	PAMLICO	NC	3	6	5	3	1
PHIPPSBURG	WASHINGTON	ME	0	1	1	1	1
PLYMOUTH	HILLSBOROUGH	FL	8	9	12	1	1
POINT LOOKOUT	ESSEX	MA	1	2	2	1	1
PORT NORRIS	PLYMOUTH	MA	7	7	7	2	1
RICHLANDS	SUFFOLK	NY	0	0	0	0	1
ROCKLAND	CUMBERLAND	NJ	4	7	3	1	1
SCRANTON	NEW LONDON	CT	1	1	1	2	1
SOUTH THOMASTON	WASHINGTON	RI	0	1	0	1	1
SOUTHAMPTON	WASHINGTON	RI	1	1	1	1	1
SOUTHPORT	NORTHAMPTON	VA	0	0	0	1	1
SPRUCE HEAD	MONMOUTH	NJ	0	0	0	0	1
SWAMPSCOTT	BRISTOL	MA	2	1	1	1	1
TANGIER	NEW LONDON	CT	1	1	1	1	1
TOMS RIVER	NEW YORK	NY	0	1	1	1	1
TOWNSEND	NEW YORK	NY	2	2	3	2	1

Port	County	State	2005	2006	2007	2008	2009
TREMONT	ESSEX	MA	1	0	1	1	1
WAKEFIELD-PEACEDALE	NEW CASTLE	DE	3	3	3	1	1
WEST SAYVILLE	SUFFOLK	NY	0	0	0	0	1
WESTPORT	PLYMOUTH	MA	7	7	7	1	1
WINTER HARBOR	WORCESTER	MD	3	5	6	2	1

Table 79 - Average GRT (gross registered tons), average length, and number of permitted scallop vessels by top 20 homeports, 1994-2008.

			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Atlantic, NC	Limited access	Avg. Length	78	81	81	81	81	81	81	81	81	81	81	81	81	.	.
		Avg. GRT	168	168	168	168	168	168	168	168	168	168	168	168	168	.	.
		No. permits	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0
	General Category	Avg. Length	73	70	70	68	68	68	63	63	63	63	63	54	63	.	.
		Avg. GRT	108	108	108	100	100	100	75	75	75	75	75	48	75	.	.
		No. permits	3	3	3	4	4	4	1	1	1	1	1	2	1	0	0
Atlantic City, NJ	Limited access	Avg. Length	.	.	.	.	.	.	.	.	.	.	.	75	75	75	75
		Avg. GRT	.	.	.	.	.	.	.	.	.	.	.	125	121	123	123
		No. permits	.	.	.	.	.	.	.	.	.	.	.	1	2	3	3
	General Category	Avg. Length	59	56	54	64	62	60	61	78	83	81	77	81	83	59	59
		Avg. GRT	73	62	62	99	90	84	90	124	145	139	121	119	128	68	68
		No. permits	5	6	5	7	9	12	11	18	23	22	26	35	37	2	2
Aurora, NC	Limited access	Avg. Length	75	75	75	75	75	83	68	73	73	56	73	73	73	68	.
		Avg. GRT	116	116	116	116	116	133	114	125	125	85	125	125	125	114	.
		No. permits	2	2	2	2	2	1	1	2	2	3	2	2	2	1	0
	General Category	Avg. Length	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		Avg. GRT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		No. permits	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Barnegat Light, NJ	Limited access	Avg. Length	69	69	69	69	69	69	65	65	69	68	68	67	67	67	67
		Avg. GRT	117	117	117	117	110	110	97	97	108	107	107	102	101	101	101
		No. permits	9	9	9	9	8	8	10	10	9	11	13	12	11	11	11
	General Category	Avg. Length	63	59	50	58	60	52	51	52	52	53	52	49	50	55	56
		Avg. GRT	91	79	44	63	73	53	48	56	54	54	50	38	40	57	58
		No. permits	9	14	10	12	11	27	35	48	51	59	63	63	62	28	27
Barnstable, MA	Limited access	Avg. Length	79	82	81	68	70	70	78	78	78	78	70	70	70	70	70
		Avg. GRT	128	141	133	80	96	90	89	89	89	89	76	76	76	76	76
		No. permits	11	9	9	4	2	1	1	1	1	1	2	2	2	2	2
	General Category	Avg. Length	45	42	41	39	40	43	40	40	41	42	42	39	40	42	42
		Avg. GRT	42	36	33	29	27	31	26	25	25	26	27	21	23	27	27
		No. permits	21	25	23	20	22	22	23	29	29	23	22	19	16	1	1
Cape Canaveral, FL	Limited access	Avg. Length	73	72	72	73	73	81	83	79	76	76	76	76	76	76	76
		Avg. GRT	136	132	132	136	136	175	160	142	140	140	140	140	140	140	140
		No. permits	3	4	4	3	3	1	2	3	2	2	2	2	2	2	2
	General Category	Avg. Length	81	.	.	.	.	.	.	.		74	67	69	65	74	68
		Avg. GRT	175	.	.	.	.	.	.	.	.	108	93	98	92	108	111
		No. permits	1	.	.	.	.	.	.	.	.	2	8	10	9	2	1
Cape May, NJ	Limited access	Avg. Length	82	82	83	82	81	80	80	80	78	74	74	74	75	77	77
		Avg. GRT	151	152	155	149	148	146	145	146	143	132	130	128	131	135	133
		No. permits	33	31	31	33	33	34	38	39	45	53	58	72	71	70	67
	General Category	Avg. Length	77	78	78	67	72	67	63	60	61	54	56	52	55	68	73
		Avg. GRT	126	130	137	109	122	104	92	88	81	65	63	56	62	93	118
		No. permits	30	28	28	29	26	36	42	43	42	48	63	73	82	25	28

Port	Permit category		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Fairhaven, MA	Limited access	Avg. Length	86	87	88	89	89	91	89	89	87	87	90	89	89	98	98
		Avg. GRT	158	158	160	166	164	171	172	166	158	158	168	162	161	185	185
		No. permits	12	13	10	10	13	12	15	11	9	9	8	9	8	5	5
	General Category	Avg. Length	43	42	45	43	42	43	46	45	45	46	46	46	45	80	94
		Avg. GRT	31	29	36	31	29	31	38	42	40	41	39	34	32	155	192
		No. permits	22	19	21	27	28	22	22	23	26	30	27	26	27	2	1
Hampton, VA	Limited access	Avg. Length	78	78	77	77	77	76	77	77	77	76	76	75	75	62	73
		Avg. GRT	152	152	152	152	154	152	162	162	162	160	158	140	124	89	112
		No. permits	15	15	11	11	8	7	6	6	6	6	7	5	7	7	6
	General Category	Avg. Length	67	.	.	42	62	62	39	46	39	62	.	73	73	45	45
		Avg. GRT	97	.	.	17	61	61	25	44	25	61	.	114	116	25	25
		No. permits	1	.	.	1	1	1	3	4	3	1	.	3	4	1	1
Lowland, NC	Limited access	Avg. Length	73	73	73	73	73	74	73	73	73	72	75	77	78	81	81
		Avg. GRT	92	92	97	92	92	107	106	106	106	102	103	112	114	118	118
		No. permits	6	6	7	6	6	8	7	7	7	8	9	8	8	7	7
	General Category	Avg. Length	68	66	66	66	66	66	66	66	66	62	73	70	69	78	82
		Avg. GRT	75	73	73	73	73	73	73	73	73	73	103	99	92	95	105
		No. permits	7	2	2	2	2	2	2	2	2	2	5	7	7	2	5
New Bedford, MA	Limited access	Avg. Length	87	88	87	87	87	87	86	85	84	84	85	82	82	84	84
		Avg. GRT	172	173	174	174	176	175	173	169	164	163	164	153	154	158	160
		No. permits	94	91	79	75	73	78	81	96	105	110	115	130	136	137	136
	General Category	Avg. Length	66	66	67	69	68	68	66	66	66	65	64	61	61	78	75
		Avg. GRT	101	102	103	110	109	107	103	101	103	102	98	94	96	140	133
		No. permits	160	156	146	146	118	113	117	123	123	124	128	130	128	67	72
New Bern, NC	Limited access	Avg. Length	84	73	71	73	73	75	77	75	77	79	79	83	76	81	81
		Avg. GRT	198	89	89	94	94	103	115	106	114	113	113	122	114	122	121
		No. permits	1	2	2	4	4	6	6	8	8	8	8	13	13	11	11
	General Category	Avg. Length	75	.	75	.	67	.	.	67	.	.	43	69	60	79	70
		Avg. GRT	81	.	81	.	79	.	.	97	.	.	18	98	80	113	90
		No. permits	1	.	1	.	1	.	.	1	.	.	1	5	6	5	10
New London, CT	Limited access	Avg. Length	.	.	.	.	.	86	86	86	86	86	86	83	81	81	81
		Avg. GRT	.	.	.	.	.	147	147	147	147	147	147	188	168	168	168
		No. permits	.	.	.	.	.	1	1	1	1	1	1	3	5	5	5
	General Category	Avg. Length	73	73	61	53	49	50	51	54	52	56	53	54	54	50	50
		Avg. GRT	125	125	85	65	55	55	59	63	52	57	49	52	52	30	30
		No. permits	3	3	5	7	9	9	8	11	10	8	11	10	10	2	2
Newport News, VA	Limited access	Avg. Length	76	78	79	79	79	79	79	78	78	78	79	79	77	78	78
		Avg. GRT	131	138	143	148	149	149	148	146	146	145	142	143	140	141	141
		No. permits	8	9	10	10	12	17	19	21	21	21	22	23	19	18	18
	General Category	Avg. Length	.	.	52	50	69	64	64	.	63	63	52	56	67	55	55
		Avg. GRT	.	.	42	42	92	88	88	.	86	86	52	74	101	51	51
		No. permits	.	.	1	1	4	1	1	.	1	1	2	8	5	2	2

			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Norfolk, VA	Limited access	Avg. Length	77	79	79	78	79	79	78	79	80	80	81	79	80	80	80
		Avg. GRT	137	138	138	138	136	133	132	133	135	137	140	139	139	141	141
		No. permits	65	67	63	58	51	42	35	27	27	27	22	13	12	11	11
	General Category	Avg. Length	66	63	66	69	70	63	59	60	60	57	55	52	51	81	81
		Avg. GRT	85	75	84	92	92	77	76	74	72	62	57	48	46	129	129
		No. permits	41	35	26	30	21	20	14	18	20	18	17	16	14	3	3
Oriental, NC	Limited access	Avg. Length	71	71	70	73	76	75	76	75	66	68	79	80	67	72	79
		Avg. GRT	101	101	108	121	127	126	127	123	100	99	115	118	94	102	123
		No. permits	2	2	3	2	4	5	4	5	5	7	9	9	14	7	4
	General Category	Avg. Length	.	.	.	.	70	69	69	70	65	65	68	68	59	40	40
		Avg. GRT	.	.	.	.	109	105	105	109	88	88	92	88	74	23	23
		No. permits	.	.	.	.	2	3	3	2	4	4	10	9	15	1	1
Point Judith, RI	Limited access	Avg. Length	85	85	76	76	76	80	80	76	76	76	82	81	79	78	78
		Avg. GRT	175	175	149	149	149	161	161	149	149	149	166	164	157	151	151
		No. permits	1	1	3	3	3	4	4	3	3	3	2	3	4	3	3
	General Category	Avg. Length	59	58	60	58	59	57	57	56	57	56	56	56	55	46	62
		Avg. GRT	73	74	78	73	74	71	70	67	70	70	67	68	67	31	91
		No. permits	71	76	72	82	78	81	76	79	80	84	87	90	93	5	8
Point Pleasant, NJ	Limited access	Avg. Length	75	75	79	79	83	83	83	82	82	82	82	82	82	71	76
		Avg. GRT	108	108	120	120	131	131	131	122	122	122	122	122	122	94	106
		No. permits	6	6	5	5	4	4	4	4	4	4	4	4	4	6	5
	General Category	Avg. Length	49	52	52	55	53	50	48	49	48	51	53	56	56	64	66
		Avg. GRT	48	53	53	60	59	47	43	45	44	48	51	56	56	78	79
		No. permits	24	20	20	21	25	27	29	33	34	31	35	37	41	14	15
Seaford, VA	Limited access	Avg. Length	86	86	82	.	.	.	.	83	87	84	84	86	87	87	87
		Avg. GRT	125	125	181	.	.	.	.	141	154	147	147	143	142	145	148
		No. permits	1	1	1	.	.	.	.	2	3	4	4	5	6	5	6
	General Category	Avg. Length	42	42	.	.	.	.	.	88	.	.	.	50	50	.	.
		Avg. GRT	6	6	.	.	.	.	.	135	.	.	.	48	48	.	.
		No. permits	1	1	.	.	.	.	.	1	.	.	.	1	1	.	.
Wanchese, NC	Limited access	Avg. Length	102	108	123	123	85	80	78	79	78	80	81	81	81	81	81
		Avg. GRT	150	148	143	143	164	129	136	143	145	151	152	152	151	151	151
		No. permits	4	3	2	2	2	1	4	8	7	7	6	6	8	8	8
	General Category	Avg. Length	76	76	75	70	74	68	65	63	59	57	54	54	54	66	73
		Avg. GRT	122	122	129	107	122	99	91	87	75	67	63	63	63	92	115
		No. permits	10	11	9	12	10	14	14	15	18	22	26	32	30	4	3

7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

7.1 Biological Impacts

Biological impacts discussed below focus on expected changes in fishing mortality. Impacts on habitat and endangered or threatened species are discussed in separate sections. Impacts of the Proposed Action are discussed in relation to impacts on regulated groundfish, other species, and bycatch (as defined by the M-S Act).

7.1.1 Biological Impacts of the Proposed Action

7.1.1.1 ACL Specifications – Impacts on Groundfish Stocks

7.1.1.1.1 Option Two – Fishery Specifications and ACLs for FY 2010 – 2012

This option proposes to adopt specifications and ACLs for FY 2010 -2012. This measure includes not only the identification of ACLs as required by the M-S Act and as implemented by Amendment 16; it includes the allocation of yellowtail flounder between the groundfish and scallop fisheries as part of the ACL process. It also incorporates adoption of the incidental catch TACs for the special management programs that use Category B DAS, adopts the TACs for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder that are applicable to the U.S./Canada Resource Sharing Understanding, and specifies the TAC for the CAI Hook Gear Haddock SAP. The biological impacts of each of these elements will be discussed in this section.

As described in Section 3.1.1, this action defines the Overfishing Level (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limits (ACLs) for the multispecies fishery. The OFLs are based on an estimate of stock size and $F_{MSY.}$ The ABCs are reduced below the OFL and are based on a control rule for each stock. These control rules were identified in Amendment 16. In most cases, the ABC is based on a fishing mortality of either 75 percent of F_{MSY} or an Frebuild, whichever is lower. The ABC is thus below the OFL and if catches are kept at or below the ABC, overfishing is unlikely to occur. The ACL is set lower than the ABC to account for management uncertainty. The ABCs – and thus the ACLs - that are specified for FY 2010 through FY 2012 are based on the fishing mortality targets adopted by Amendment 16. These targets were designed to end overfishing and to rebuild groundfish stocks consistent with the requirements of the M-S Act and the Council's rebuilding goals. The ABCs were set by the Science and Statistical Committee (SSC). In all cases the ACL is lower than the ABC. The calculation of these values is described in detail in Appendices I through IV.

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

For stocks that have an age-based assessment and an age-based projection model, the impacts on stock size of setting the ABCs can be estimated using short-term projections. These project the estimated median stock size expected to result by limiting catches to the ABC. While these projections are based on the scientific advice of the GARM III and TRAC panels, the SSC, and the Groundfish Plan Development Team, projections are subject to uncertainty and future stock size may differ from the trajectories illustrated here. Since the ACL is lower than the ABC, these projections may under-estimate stock rebuilding. The ACL, however, is designed to increase the likelihood of achieving the ABC. These short-term projections differ slightly from those reported in Amendment 16 because they use more recent data that was not able for preparation of that document. As an overview, these projections used estimated catch for 2008 and assumed that 2009 fishing mortality is that estimated to result from management measures adopted by an interim action in FY 2009. The calculations are described in detail in Appendix III.

The projection results are shown in Figure 24 through Figure 36. Each figure includes the upper quartile, median, and lower quartile of the projected stock size, the most recent estimate of stock size, and the target stock size, or SSB_{MSY}. Note that for GB yellowtail flounder two figures are shown. This stock was assessed at the Transboundary Resources Assessment Committee (TRAC) in 2008. At that meeting, two assessment models were put forward. One model (labeled "including") includes the Canadian survey results for 2008 and 2009; the second model (labeled "excluding") does not. The "excluding" model gives lower estimates of stock size.

Projections for most stocks indicate increases in stock size during the three years FY 2010 through FY 2012. Two exceptions are the two haddock stocks. GB haddock stock size is expected to decline as the exceptional 2003 year class is subject to fishing and natural mortality, but should remain above SSB_{MSY} in the short term. GOM haddock stock size is also projected to decline to slightly less than SSB_{MSY} over the next three years. If the projections prove accurate, GOM cod, GB haddock, plaice, redfish, and perhaps GB yellowtail flounder (if the "including" assessment model proves accurate) will be above SSB_{MSY} during this three year period. GOM haddock, GB yellowtail flounder (under either assessment model), CC/GOM yellowtail flounder, SNE/MA yellowtail flounder, witch flounder, white hake, and GB winter flounder should increase to more than the minimum biomass threshold and will no longer be overfished. These latter stocks, however, are not expected to reach their target biomass. The projections indicate GB cod, SNE/MA winter flounder, and Atlantic halibut will remain overfished in FY 2012.

Similar estimates cannot be developed for GOM winter flounder, the two windowpane flounder stocks, ocean pout, pollock, and Atlantic wolffish as projections are considered unreliable for those stocks.

When compared to the No Action alternative, the projected stock size under the Proposed Action is identical. This is because the projections for both alternatives use the ABC as future catch. But with the Proposed Action, an ACL is set below the ABC. This means that the catch is more likely to be at or below the ABC in the Proposed Action and so the stock size trajectories are more likely to be realized. The primary difference between the Proposed Action and the No Action alternatives is that there is less risk that the ABCs will be exceeded under the Proposed Action.

The National Standard Guidelines for National Standard 1 (50 CFR 600.310) suggest that the ABC, when possible, should be based on the probability that an actual catch equal to the ABC would result in overfishing. Further, the NSGs indicate this probability cannot exceed 50 percent and should be lower. For the ABCs identified by this action, the probability that overfishing will occur should catch equal ABC can only be determined for stocks with age-based assessments and projections. Because of the way ABC is defined, this probability will never exceed 50 percent: the ABC is set using a fishing mortality that is always at least 25 percent less than F_{MSY} . The specific probabilities were evaluated by running a short-term projection with catch set at the ABC and determining the probability that the point estimate of F_{MSY} (or its proxy) would be exceeded. It is acknowledged that this is only a partial analysis because, as noted by the SSC (see Appendix I), it is not possible to quantify all elements of scientific uncertainty when determining the ABC for groundfish stocks. This type of analysis could be improved if other elements are quantified in the future.

Results of the analysis are shown in Table 80. With the proposed ABCs, over the next three years the probability that overfishing will occur if catch equals ABC does not exceed 20 percent for any of the stock/year combinations. For several stocks the probability of overfishing if catch equals the ABC approaches zero. These values are the same for the No Action alternative, since it is assumed the same ABC will be adopted

Specifying the CAI Hook Gear Haddock SAP TAC is not expected to increase fishing mortality for GB haddock. The TAC is a subset of the overall ACL for GB haddock and as such it does not increase possible catches. Regulations implementing the SAP include sufficient monitoring requirements that the TAC is not likely to be exceeded. Recent catches in the SAP have not approached the proposed TACs. Framework 42 adopted a mechanism for adjusting the TAC for the CAI Hook Gear Haddock SAP based on the relative difference between exploitable biomass in 2004 and the projected exploitable biomass for a given year. With respect to the TAC for the CAI Hook Gear Haddock SAP, the Proposed Action and the No Action alternative are the same. This action does not consider changing the formula adopted by FW 42, but just presents the results of applying that formula to projected stock size. It is included here to facilitate preparation of the EA for all specifications for this fishery. There is no difference between the biological impacts of the Proposed Action and the No Action alternative since they are the same.

Adopting specifications for groundfish stocks is likely to have only limited impacts on non-groundfish species. Specifications are an administrative measure, and they are calculated in such a way to achieve the mortality targets adopted by Amendment 16. If catches exceed an ACL it can lead to triggering an AM. As discussed in Amendment 16, the management measures (including AMs) adopted to achieve the mortality targets may lead to effort shifts into some other fisheries. These specifications are not expected to result in any additional biological impacts on other stocks beyond those described in Amendment 16. No difference are expected between this Proposed Action and the No Action alternative.

Figure 24 – GB cod: short-term projection with catch at ABC

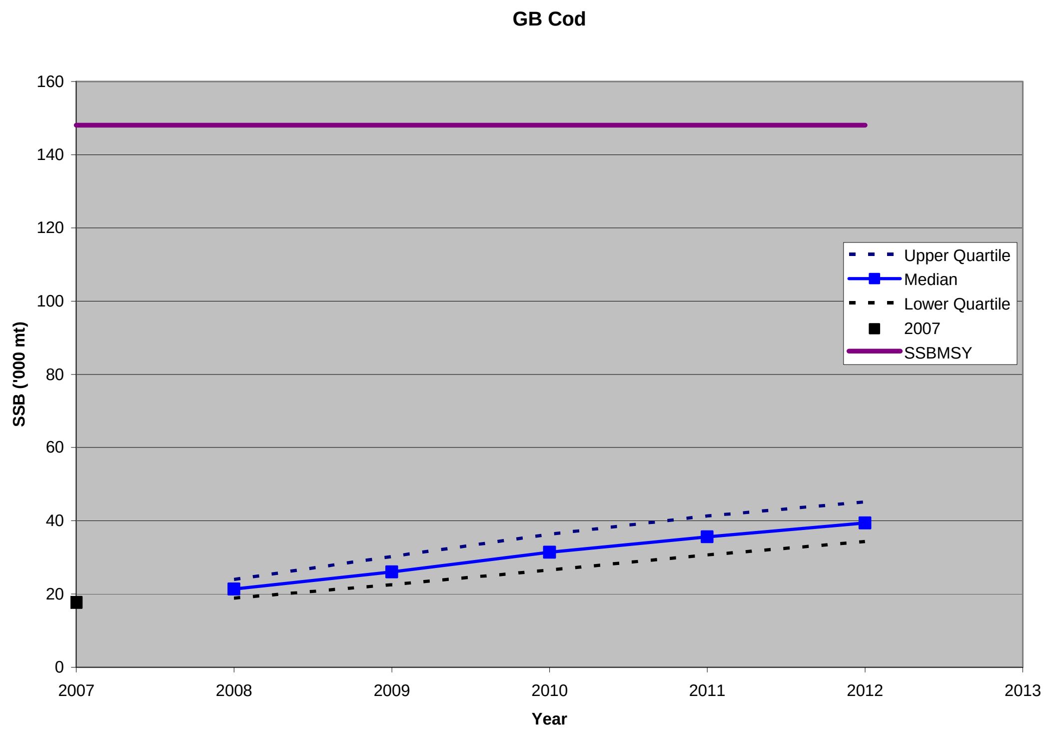


Figure 25 – GOM cod: short-term projection with catch at ABC

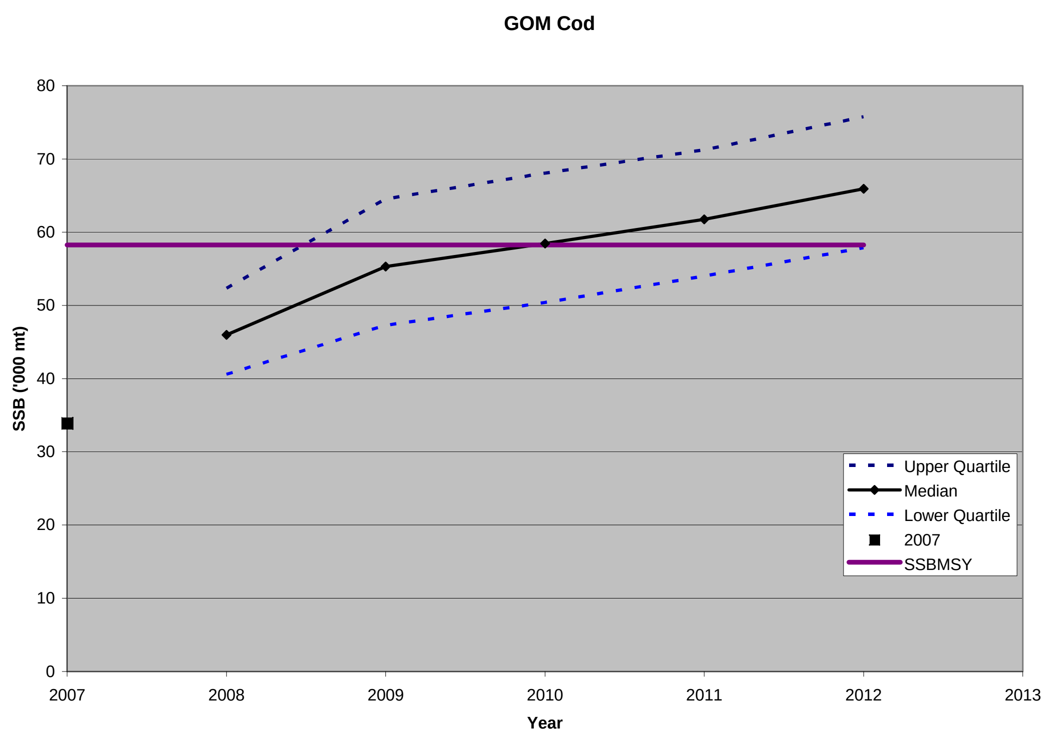


Figure 26 – GB haddock: short-term projection with catch at ABC

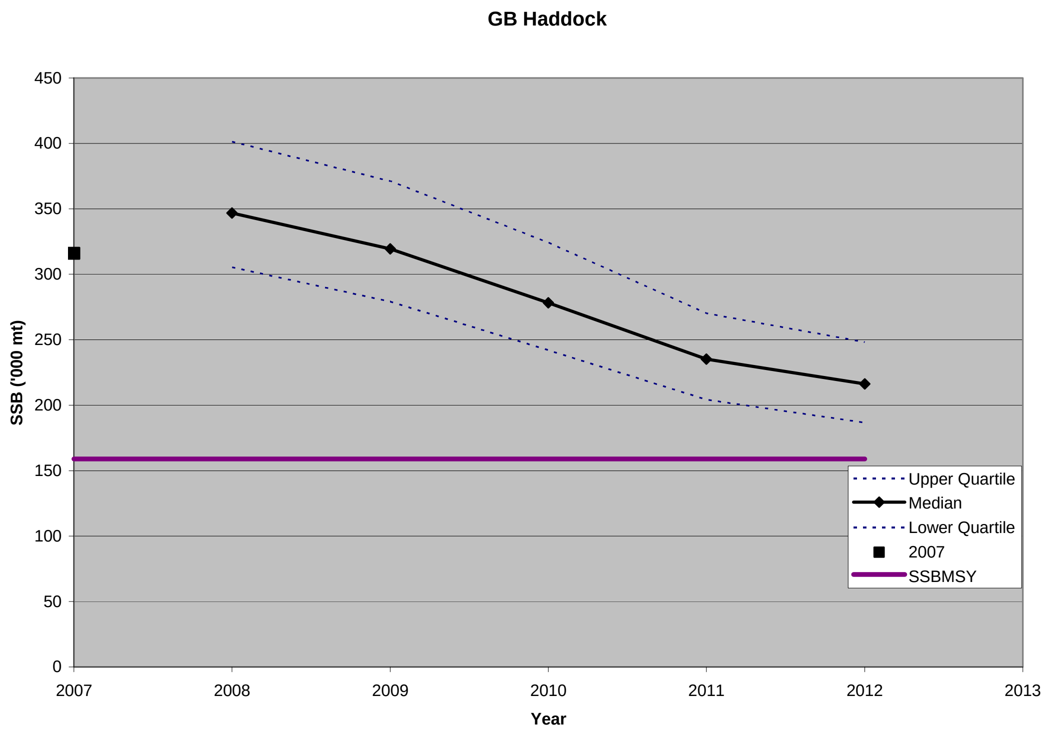


Figure 27 – GOM haddock: short-term projection with catch at ABC

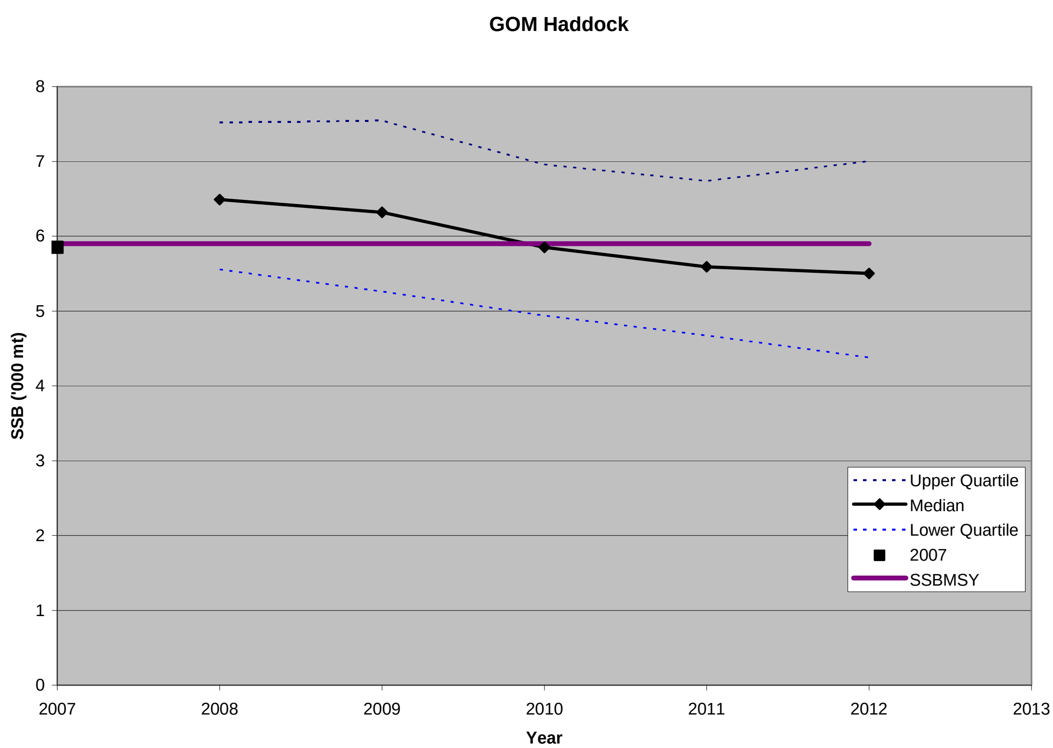


Figure 28 – GB yellowtail flounder (including): short-term projection with catch at ABC

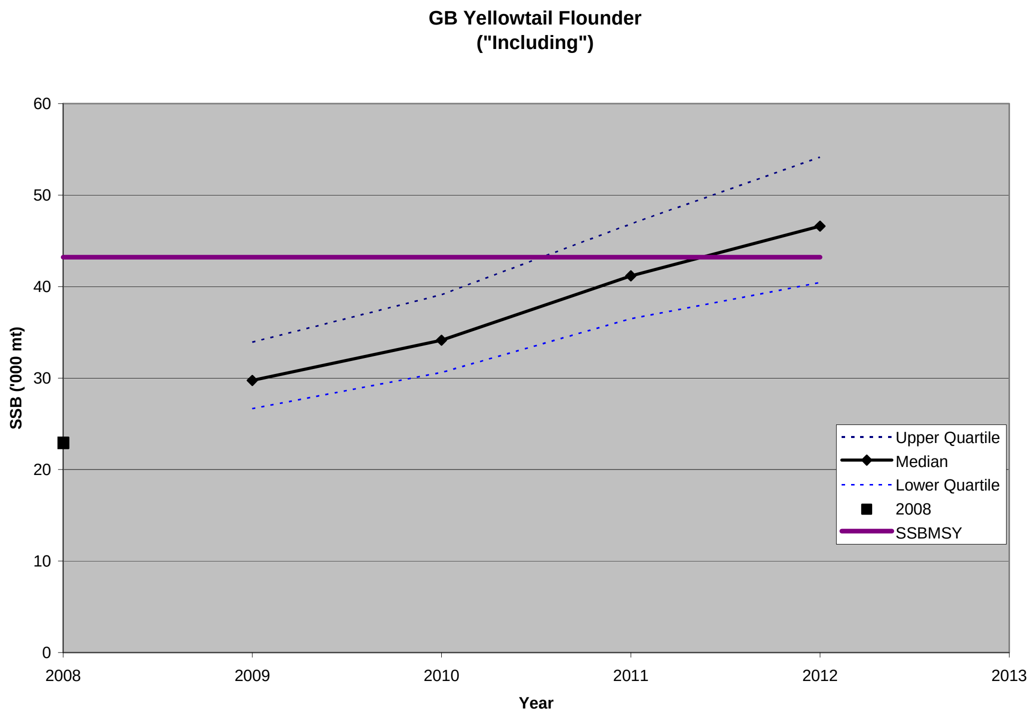


Figure 29 – GB yellowtail flounder (excluding): short-term projection with catch at ABC

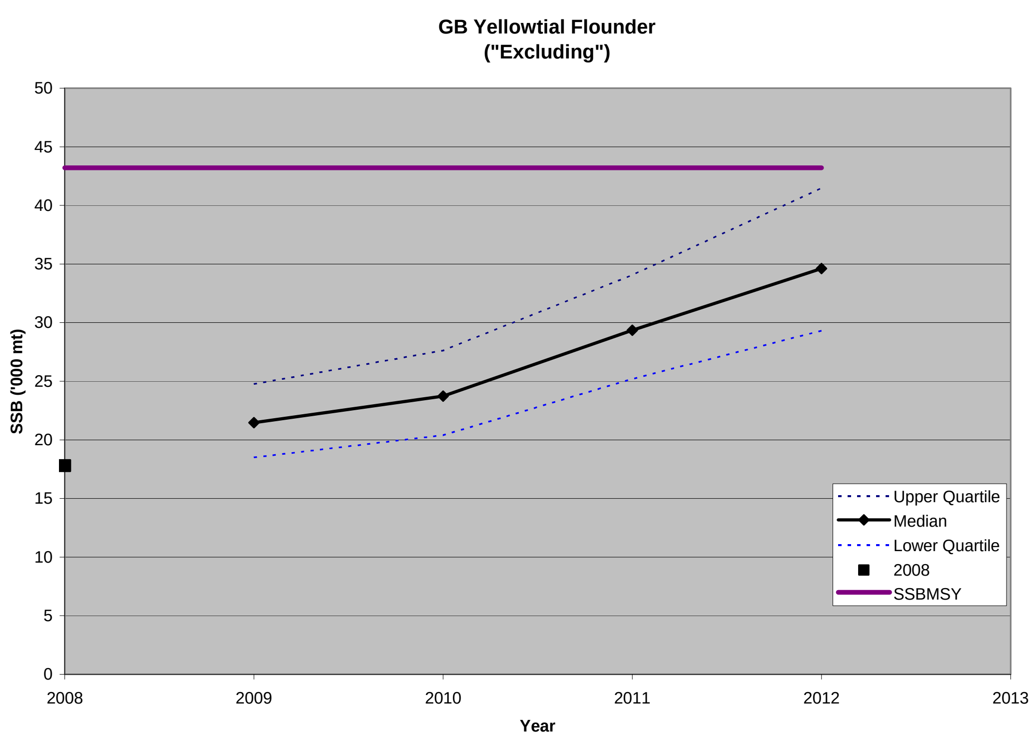


Figure 30 – CC/GOM yellowtail flounder: short-term projection with catch at ABC

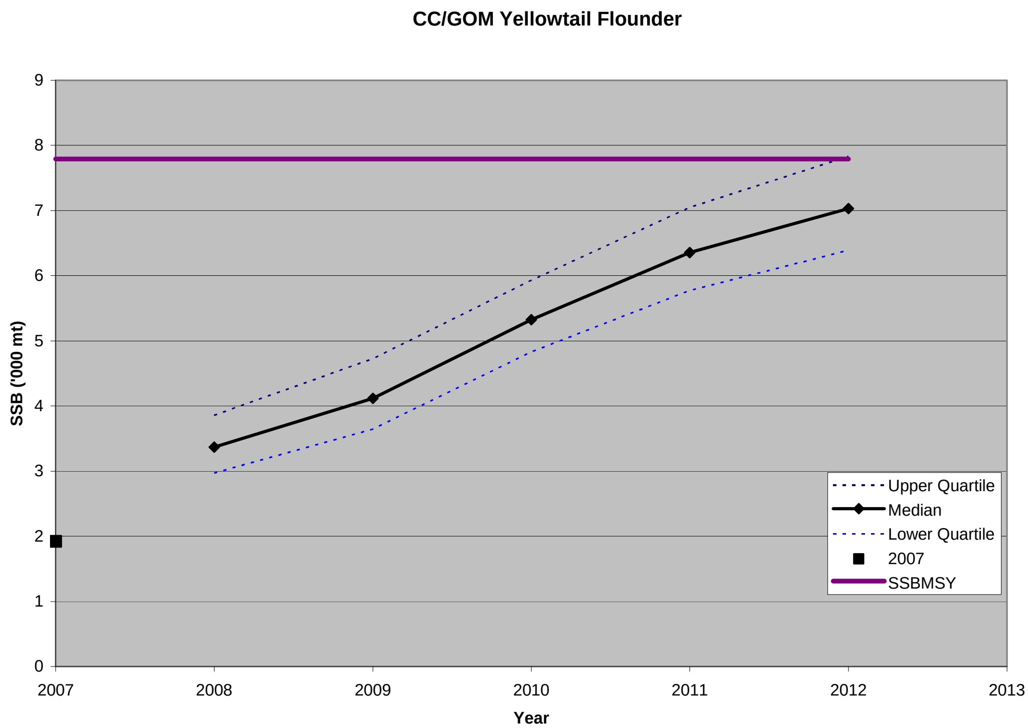


Figure 31 – SNE/MA yellowtail flounder: short-term projection with catch at ABC

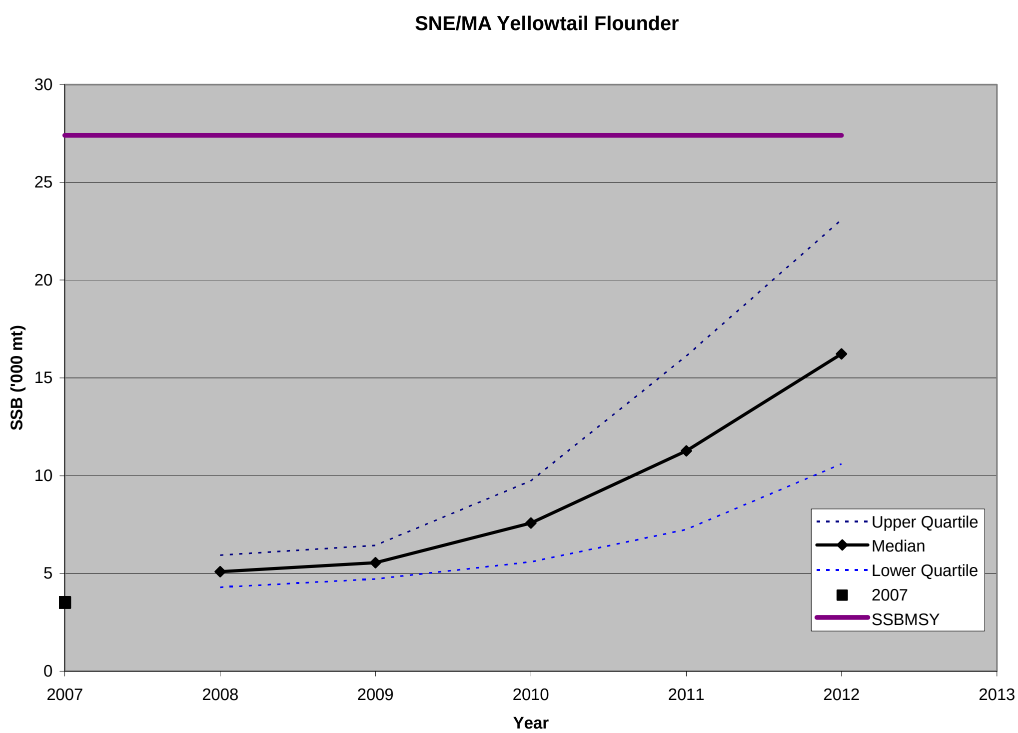


Figure 32 - American plaice: short-term projection with catch at ABC

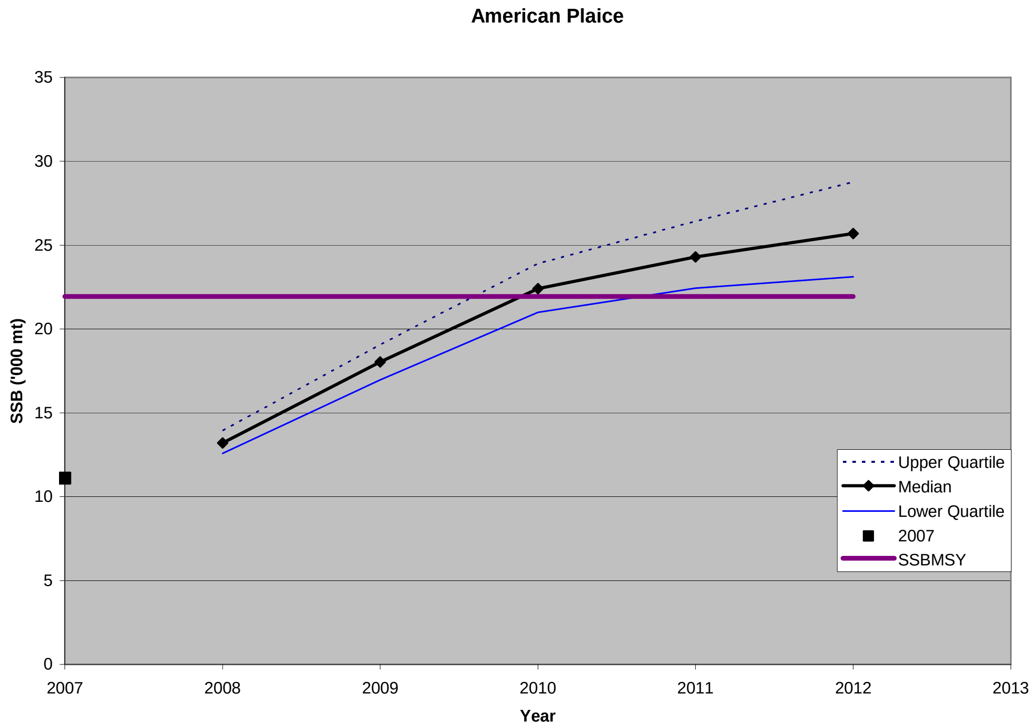


Figure 33 – Witch flounder: short-term projection with catch at ABC

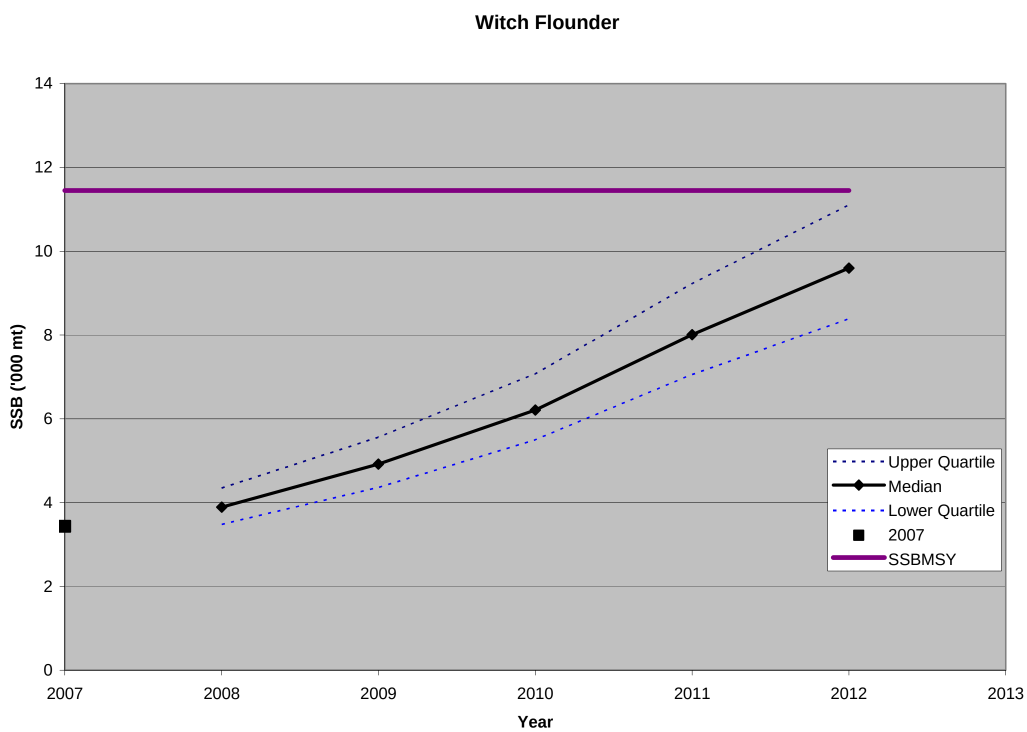


Figure 34 – GB winter flounder: short-term projection with catch at ABC

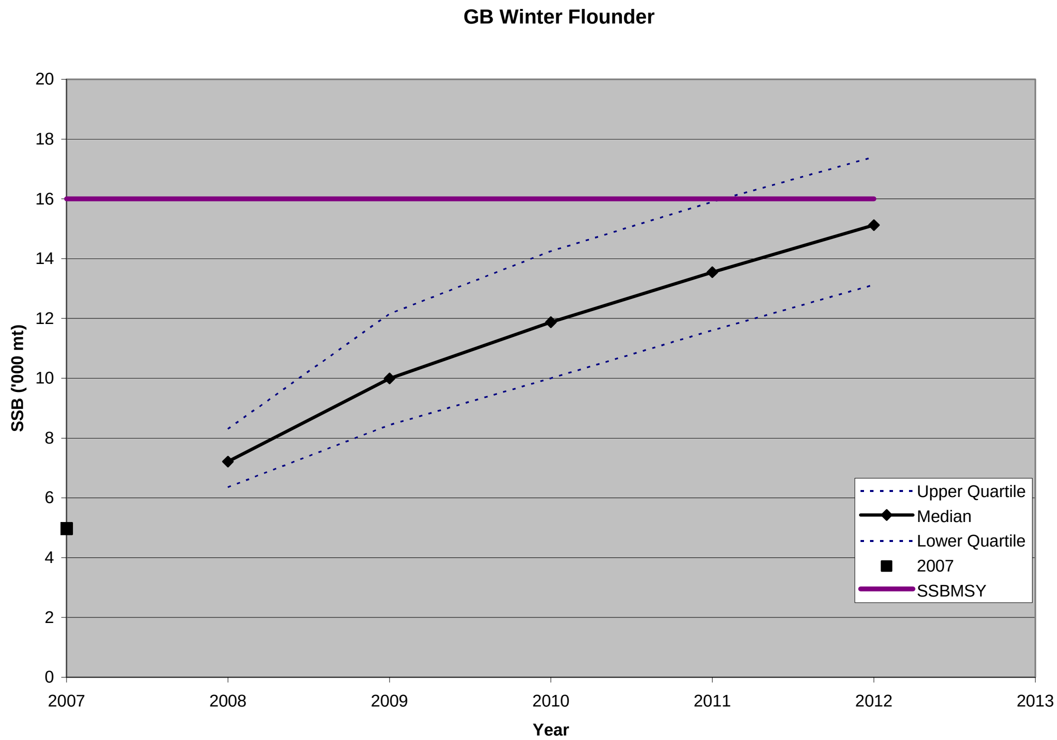


Figure 35 – SNE/MA winter flounder: short-term projection with catch at ABC

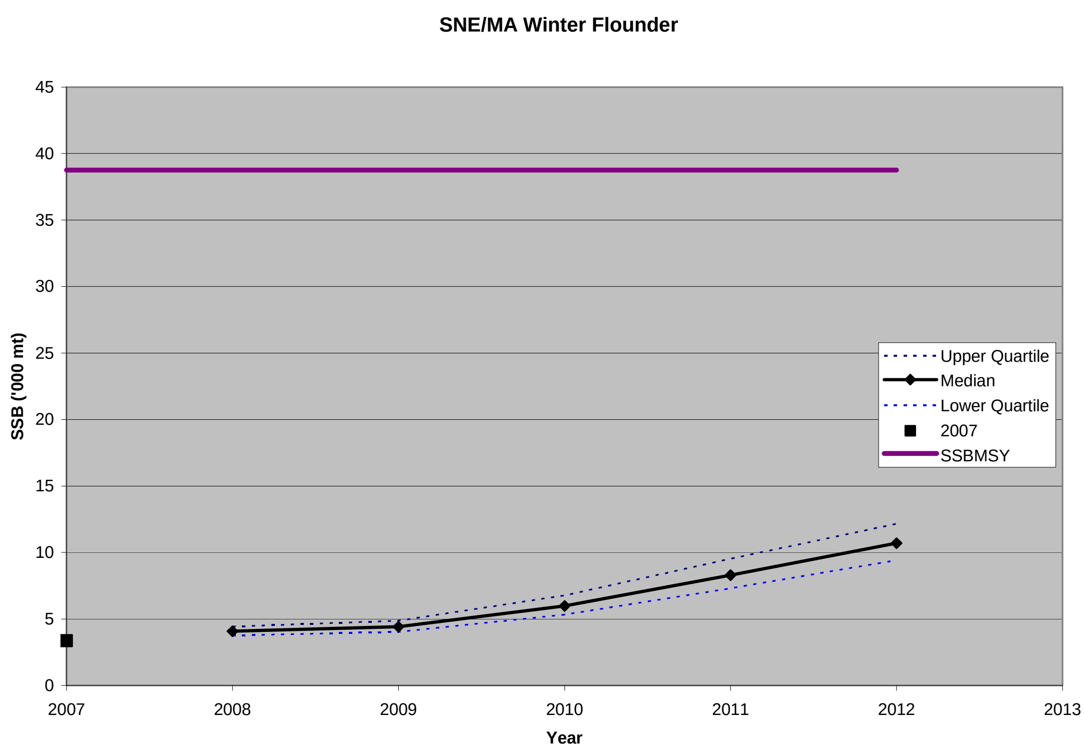


Figure 36 – Redfish: short-term projection with catch at ABC

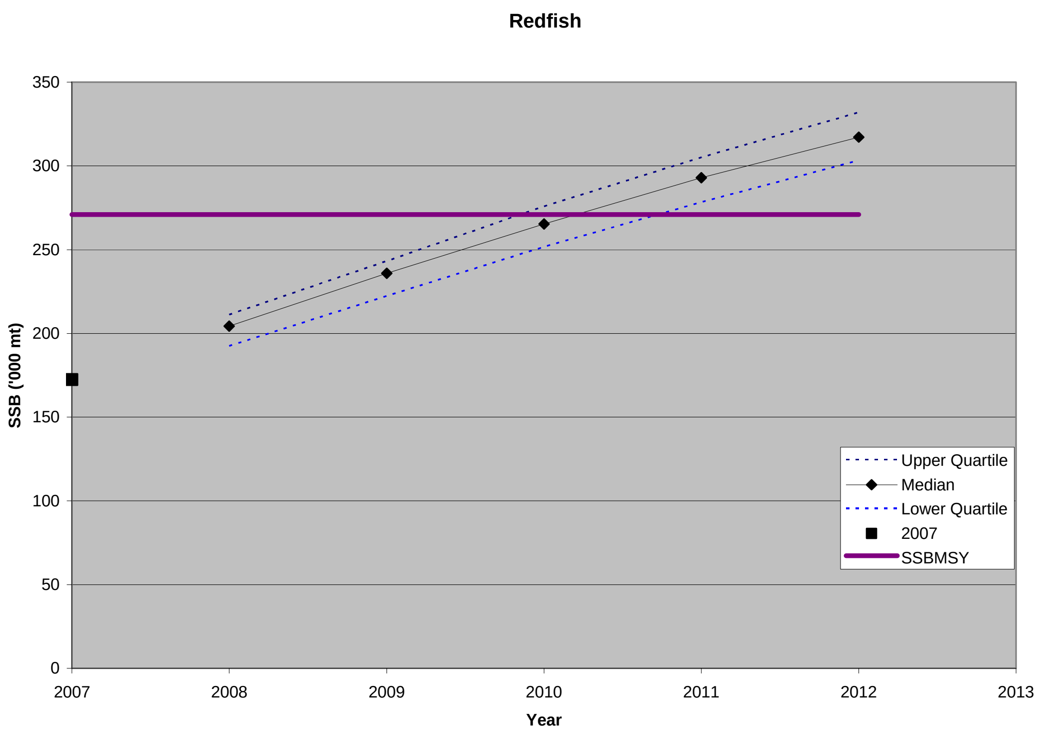


Figure 37 – Atlantic halibut: short-term projection with catch at ABC

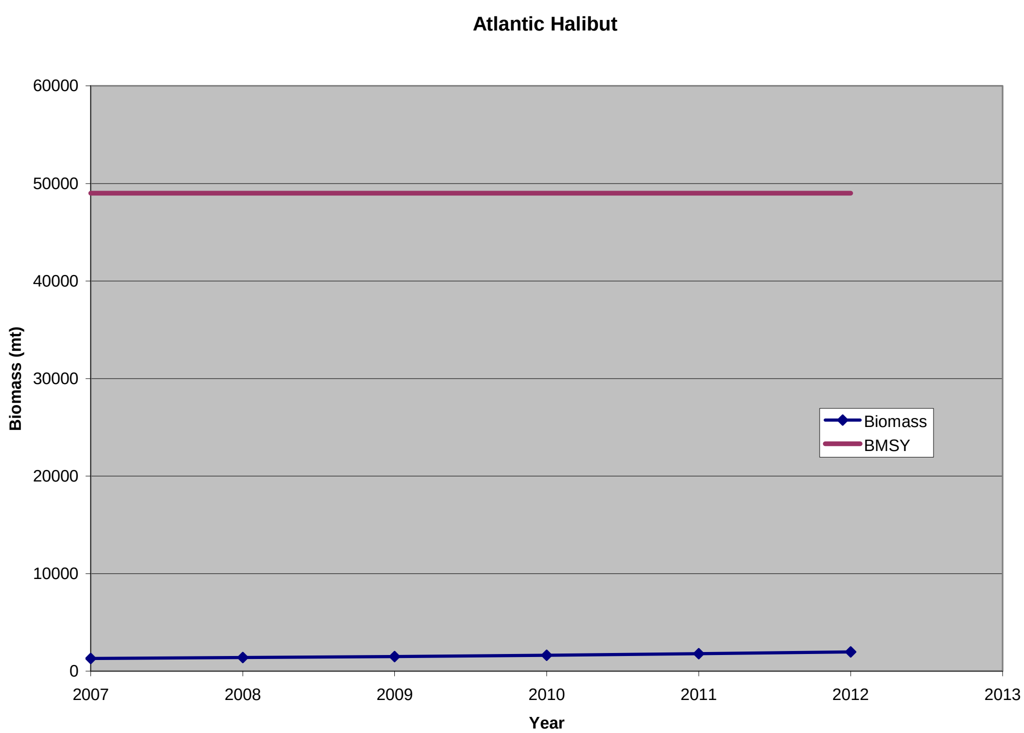


Table 80 – Probability that overfishing occurs ($F>F_{MSY}$) if catch is equal to ABC

(1) Two results shown for GB yellowtail flounder because two assessment runs are used for this stock

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

Species	Stock	2010	2011	2012
Cod	**GB**	0.118	0.153	0.170
Cod	**GOM**	0.133	0.148	0.159
Haddock	**GB**	0.027	0.020	0.018
Haddock	**GOM**	0.003	0.013	0.014
Yellowtail Flounder(1)	**GB**	0.000	0.000	0.000
Yellowtail Flounder(1)	**GB**	0.000	0.000	0.000
Yellowtail Flounder	**SNE/MA**	0.000	0.001	0.046
Yellowtail Flounder	**CC/GOM**	0.035	0.040	0.051
American Plaice	**GB/GOM**	0.003	0.019	0.057
Witch Flounder		0.078	0.123	0.150
Winter Flounder	**GB**	0.184	0.191	0.199
Winter Flounder(2)	**GOM**			
Winter Flounder	**SNE/MA**	0.000	0.000	0.000
Redfish		0.000	0.000	0.000
White Hake (2)	**GB/GOM**			
Pollock(2)	**GB/GOM**			
Windowpane (2)	**GOM/GB**			
Windowpane(2)	**SNE/MA**			
Ocean Pout(2)				
Atlantic Halibut(2)				

As part of the ACL process, the ABC of each stock is distributed to various sub-components. As described in Amendment 16, some of these sub-components are considered sub-ACLs and are subject to AMs. These include the groundfish fishery ACL for all stocks. For GOM haddock and GOM cod, the recreational and commercial groundfish fishery components receive an allocation that is a sub-ACL subject to AMs. Within the commercial groundfish fishery, the ACL is distributed to the common-pool and sector vessels based on sector membership. In the case of GB and SNE/MA yellowtail flounder, the scallop fishery receives a specific allocation. While in FY 2010 this is considered a sub-component that does not have specific AMs, beginning in FY 2011 these allocations are treated as sub-ACLs and the scallop fishery will be subject to AMs if they are exceeded.

There are two components that are not considered ACLs and are not subject to individual AMs: state waters catches that occur outside of the management plan (that is, by state permitted vessels) and an "other" sub-component that accounts for small catches of each stock in a number of fisheries. In most instances these values are five percent or less. There are a few exceptions. Recreational catches of GOM and SNE/MA winter flounder occur primarily in state waters and result in a larger percentage of the ABC assumed caught in state waters. This is also the case with pollock, but to a lesser extent. Commercial catches of windowpane flounder within state waters also result in an increased proportion assumed to be caught in state waters by vessels with state permits.

The overall result of the distribution of the ABC and the ACL to the various components is that the portion of the catch that is controlled by the specific FMP management measures differs from stock to stock. Since measures are only applicable to a portion of the fishery there may be some uncertainty over the ability of the management plan to control catches. As an example, the federal management plan has no authority to control catches within state waters by vessels that do not hold a federal permit. In the case of SNE/MA winter flounder, this means that as much as 30 percent of the ABC may not be controlled by measures of the federal plan. The attainment of mortality goals will either require more onerous restrictions on federal permit holders or complementary action by state authorities. To the extent the proposed specifications correctly capture the proportion of each stock that is caught by these other sub-components, the plan is more likely to achieve the mortality targets. It should be noted that the AM system does subject all catches to an AM, even if specific management measures do not address a component of the fishery. If the overall ACL is exceeded, AMs are triggered on the part of the fishery that can be affected by the AMs, even if the overage is the result of catches outside the purview of the management plan. As an example, if state waters catches of SNE/MA winter flounder lead to catches higher than the overall ACL, then the AMs are triggered for the federal component of the fishery.

Table 81 summarizes the proportion of each stock that is subject to the federal management measures based on the distributions proposed or assumed in this action. Some components – primarily the state waters catch – are not allocated by the Council, but represent an estimate of what will be harvested in state waters.

When compared to the No Action alternative, the Proposed Action setting of ACLs is likely to have a higher probability of achieving mortality targets since the ACL is set below the ABC, whereas in the No Action alternative the ACLs are set at the ABC.

Table 81 – Percent of each stock's ABC expected to be subject to Northeast Multispecies FMP management measures

Stock	Percent of ABC
GB Cod	95%
GOM Cod	85%[1]
GB Haddock	95%
GOM Haddock	95%
GB Yellowtail Flounder	95%
SNE/MA Yellowtail Flounder	95%
CC/GOM Yellowtail Flounder	95%
Plaice	95%
Witch Flounder	95%
GB Winter Flounder	95%
GOM Winter Flounder	70%
SNE/MA Winter Flounder	87%
Redfish	95%
White Hake	95%
Pollock	88%
N. Windowpane Flounder	70%
S. Windowpane Flounder	70%
Ocean Pout	95%
Atlantic Halibut	45%
Atlantic Wolffish	95%

(1) An unknown portion is caught by recreational vessels in state waters outside the FMP.

As previously noted there are some distributions to sub-ACLs, each subject to AMs. While these allocations do not change the size of the ABC/ACL, they may have different biological impacts because the exact measures that control catch may differ between the sub-components. As an example, there are separate allocations to the commercial common-pool and sector vessels for most groundfish stocks (the exceptions are the windowpane flounder stocks, ocean pout, SNE/MA winter flounder, and Atlantic wolffish). In this instance the allocation is based on the vessels that commit to sectors – the sum of the Potential Sector Contribution (PSC) for the vessels within sectors determines how much is allocated. Based on the sector rosters as of September 1, 2009, the majority of the allocated stocks will be assigned to sectors (see Table 64). This means that the majority of these stocks allocated to the groundfish fishery will be subject to a hard TAC and extensive monitoring requirements. The assumption is that these types of measures will increase the likelihood that fishing mortality targets are met. In the case of GOM cod and GOM haddock, because parts of these stocks are allocated to the recreational fishery, a substantial portion of the stocks will have less certain management controls. These factors were considered in determining the difference between the ABC and the ACL for each stock, and stock-specific evaluations are described in Appendix III.

In the case of yellowtail flounder there may be different impacts over the period addressed by this action. While in FY 2010 the yellowtail flounder allocated to the scallop fishery is treated as an other sub-component and is not subject to a scallop-fishery AM, in subsequent years these allocations will be subject to specific AMs. So in FY 2010 there may be less certainty about achieving mortality targets, but this likelihood should increase in FY 2011 and beyond. While there are AMs on the portion of the scallop fishery catch of yellowtail flounder taken in the CAI, CAII, and NLCA access areas, these do not control overall catches of yellowtail flounder by the scallop fishery. When compared to No Action, there is more control over catches of yellowtail flounder and as a result more certainty that mortality targets will be met.

This measure also implements incidental catch TACs for special management programs. Incidental catch TACs were established to limit catches of groundfish stocks of concern when vessels in the common pool use Category B DAS to target healthy stocks. They apply to the Category B regular DAS program and certain special access programs (SAPs). The incidental catch TACs are a percentage of the common pool ACL and thus do not result in an increase in catch. The size of these TACs depends on the number of vessels that remain in the common pool and the PSC associated with those vessels. Based on the September 1 sector rosters, the incidental catch TACs are small for many stocks in some programs. In some cases they are small enough that NMFS may not be able to allow the SAP to open because of an inability to monitor the small TACs. If this occurs, then access to healthy stocks will be limited and fishing mortality for those stocks may be lower than if the SAP opens. Based on the September 1, 2009 sector rosters, it is not likely that the lack of access to special management programs will have a noticeable impact on the fishing mortality of healthy stocks because the small incidental catch TACs will limit the catches within those programs if they are open. In FY 2007 and FY 2008 only small amounts of the incidental catch TACs were caught (see Table 82). These TACs are smaller than the ones that would result under No Action, reducing the risk mortality targets will be exceeded.

Table 82 – Recent catches of incidental catch TAC stocks. Values in metric tons unless otherwise described

	FY 2007		FY 2008	
	TAC	Total - mt	TAC	Total - mt
GB Cod		3.3		0.6
GOM Cod	99	3.6	103.9	2.4
GB YTF		0.0		0.0
CC/GOM YTF	10.8	0.3	14.1	<=10 lbs.
SNE/MA YTF	2.1	0.0	3.1	0.0
GB WFL	32.1	<=10 lbs.	35.6	<= 50 lbs.
SNE/MA WFL	30.2	0.1	35.8	<=10 lbs.
Plaice	205.2	1.3	256.1	0.1
Witch	253.8	1.6	216.6	0.1

Impacts on Non-Groundfish Species

Adopting the proposed specifications is not expected to have direct impacts on non-groundfish species. Indirect effects are generally likely to be beneficial. The specifications, when combined with the AMs adopted by Amendment 16, could reduce groundfish fishing activity. Catches of other species that occur on groundfish trips would decline as a result. There are only limited opportunities for groundfish vessels to target other stocks in other fisheries, so the shifting of effort into other fisheries is not likely to occur on a large scale. These other fisheries will also have ACLs and AMs so while such effort shifts may have economic effects the biological impacts should not be negative. Because the catches in this measure are slightly less than under No Action, the Proposed Action may slightly benefit non-groundfish species.

7.1.1.1.1.1 Yellowtail Flounder Allocation to the Scallop Fishery

This measure allocates a portion of the yellowtail flounder ACL to the scallop fishery to account for incidental catches in that fishery. In FY 2010, the allocations to the scallop fishery are considered an “other sub-component” and are not subject to specific scallop fishery AMs. In subsequent years the allocation is considered a sub-ACL and the scallop FMP, through Amendment 15 (to be implemented in 2011) will adopt AMs to control these catches. Two options are considered for the amounts that will be allocated, each with slightly different biological impacts to groundfish stocks. In general, both options merely allocate part of the annual catch limit between the two fisheries and should not lead to catches that exceed mortality targets. But the options may distribute the catches differently, which may have some impacts.

Allocations are proposed for two stocks - GB yellowtail flounder and SNE/MA yellowtail flounder. In FY 2010 the allocation is considered an “other sub-component” and as such is not subject to AMs. The allocation is 100 percent of the amount the scallop fishery is expected to harvest. This value was calculated by taking into account recent discard rates in the scallop fishery and projected changes in scallop and yellowtail flounder stock sizes. In FY 2011 and FY 2012, the allocations are sub-ACLs and are 90 percent of the amount the scallop fishery is expected to catch if they harvest the projected scallop yield. These amounts of yellowtail flounder were estimated by comparing recent discard rates, projected increases in scallop and yellowtail flounder abundance, and future scallop yields. The scallop fishery catch of CC/GOM yellowtail flounder is estimated to be a small amount and so a specific allocation is not made; catches are considered part of the “other sub-components.”

In FY 2010, as mentioned, the yellowtail flounder allocations do not have specific AMs that control the overall yellowtail flounder catch. If the scallop fishery fishes in CAI, CAII, or the NLCA, it is limited to harvesting 10 percent of the ACL from within those areas, but there are no controls on the catch outside those areas. Should the scallop fishery exceed the amount of yellowtail flounder that is allocated, then if the groundfish fishery harvests its allocation the total catch of yellowtail flounder could exceed the ACL. While the ACL is set well below the overfishing level for both stocks and it is unlikely that total catches will approach this amount, rebuilding fishing mortality targets may not be met since the ACL is set closer to the ABC.

This result is less likely in subsequent years. While the exact scallop fishery AMs are still being developed, these AMs will create an incentive for scallop fishermen to control yellowtail flounder catches to avoid triggering the AMs. The result may be reduced catches of yellowtail flounder by the scallop fishery. Under No Action, there are no limits on the overall catch of GB and SNE/MA yellowtail flounder by the scallop fishery, increasing the risk total catches will exceed the overall ACL, particularly after FY 2010.

With respect to CC/GOM yellowtail flounder, this measure does not identify a specific allocation for the scallop fishery. The measure proposes that scallop fishery catches of this stock be considered part of the “other sub-components” part of the overall ACL. Scallop dredge discards as a percentage of the total catch from this stock have fluctuated during the period 2003 – 2007, in recent years, ranging from 0.6% to 5.6% percent (see Table 83). The amounts expected to be harvested by the scallop fishery are within this range. Other fisheries that may take small amounts of CC/GOM yellowtail flounder include state waters fisheries, the whiting fisheries, and the northern shrimp fishery. If scallop fishery catches remain low, then considering this catch part of an other sub-component does not risk mortality targets. As the scallop fishery catch increases, however, it becomes more likely that the total catch by these other fisheries may exceed the amount allocated to the other sub-component category. The likelihood of this occurring can be partially controlled by the selection of scallop management alternatives that minimize yellowtail flounder catches.

Table 83 – Recent scallop dredge catch of CC/GOM yellowtail flounder (Source: GARM III)

Year	Scallop Dredge Catch	Total Catch	Dredge Discards as Percentage of Total Catch
2003	25	1970	1.3%
2004	18	1186	1.5%
2005	6	997	0.6%
2006	11	620	1.8%
2007	35	627	5.6%

This option does not modify the amount of yellowtail flounder than can be taken inside the Georges Bank access areas. That amount is still limited to 10 percent of the ABC. The distribution proposed in this action will not have any impact on the amount of yellowtail flounder that can be taken by the scallop fishery within the CAI, CAII, and NLCA access areas. In this respect this option does not differ from No Action.

Impacts on Non-Groundfish Stocks
The allocation of yellowtail flounder to the scallop fishery will have the most direct impacts on scallop stocks. If scallop fishermen cannot control the rate of incidental catches to the amount of yellowtail that is allocated, some scallop yield will be foregone. This could reduce fishing mortality on sea scallops. The extent that this occurs will depend not only on actual discard rates, but on what AMs are in place for the scallop fishery in future years. Estimates are that the scallop fishery will forego approximately 2,100 mt of scallop yield (meat weight) in FY 2011 and 1,700 mt of scallop yield in FY 2012. It is expected these reductions will likely occur in open areas rather than access areas.

There may also be impacts on other stocks caught in the sea scallop and groundfish fisheries. For example, if sea scallop fishing activity is reduced because of yellowtail flounder incidental catches, catches of skates, monkfish, and other species caught by scallop fishermen may be reduced. Similar effects on a wider range of species may occur if the groundfish fishery loses effort as a result of allocating yellowtail flounder to the scallop fishery. Catches could be reduced of monkfish, skates, lobster, fluke, and other species caught by trawl fishermen. Since limits on GB and SNE/MA yellowtail flounder catch would not be in place under No Action, catches of other species could be higher.

7.1.1.1.1.2 Sub-option 2 – U.S/Canada Resource Sharing Understanding TACs

The proposed TACs were set at levels that correspond to the fishing mortality rates consistent with the management strategy agreed to under the Understanding, as well as with the recommendation of the Science and Statistical Committee (SSC; for GB yellowtail flounder). Under the Understanding, the strategy is to maintain a low to neutral risk of exceeding the fishing mortality limit reference (F_{ref} = 0.18, 0.26, 0.25, for cod, haddock, and yellowtail flounder, respectively). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. The recommended 2010 TACs for cod, haddock, and yellowtail flounder were based upon the most recent stock assessments (TRAC 2009a, 2009b, 2009c). The 2010 TACs for Eastern GB cod and haddock were recommended by the Transboundary Management Guidance Committee (TMGC), based upon the fishing mortality strategy shared by both the

United States and Canada. The proposed TAC for GB yellowtail flounder was based upon the requirements of the Northeast Multispecies Fishery Management Plan (FMP) and the recommendation of the SSC. The full justification for the proposed TACs is described in Section 3.1.1.2 of this EA.

Based upon fishing years 2004 through 2008, information on catch (landings and discards) from the U.S. Canada Management Area, the management measures implemented by Amendment 13 and subsequent framework adjustments have restrained the catches of GB cod, haddock, and yellowtail flounder, to below their respective TACs with one minor exception. In FY 2007, the catch of GB yellowtail flounder exceeded the TAC by nine percent due to some late reporting and because a portion of the yellowtail catch by the scallop fleet was not considered until after the end of the fishing year. A downward adjustment was made in the size of the 2008 TAC. In order to prevent such an overharvest from recurring, the monitoring methodology was modified to evaluate the amount of yellowtail catch from the scallop fishery more frequently.

Based upon preliminary information, NMFS does not anticipate that there will be an overage (i.e., the catch will not exceed the TAC) for FY 2009 for Eastern GB cod, Eastern GB haddock, or GB yellowtail flounder.

Although it is not possible to separate out the precise impact of the hard TACs on the overall pattern of fishing behavior and landings, the TACs and associated regulations have played an important role in determining fishing patterns on GB, as further explained in the Economic Impacts of the proposed TACs. Because the proposed TACs are based upon fishing mortality rates that are in accordance with the Understanding and the FMP, and the management measures that are associated with the U.S. Canada Management Area have been demonstrated to effectively control fishing effort, the proposed TACs are appropriate and will contribute toward the growth of the GB cod and yellowtail flounder stocks, and the maintenance of the GB haddock stock. Because the TACs will contribute toward the growth and maintenance of the stocks, the biological impacts will be positive. As a result of the likely implementation of Amendment 16 in FY 2010 there will be a wide range of substantive regulatory changes and potential changes in fishing behavior in the groundfish fishery, which arguably could result in a greater risk that the U.S./Canada TACs will be exceeded. However, it should be noted that the ACLs specified in FW 44 account for management uncertainty, and Amendment 16 management measures include many tools for monitoring of the fishery.

In contrast, as described in Section 6.1.2.1.1, the biological impacts of the No Action Alternative, would be primarily negative. The No Action Alternative does not represent the appropriate level of TACs from a biological perspective, and would allow fishing mortality to be too high. Allowing an excessive amount of fish to be caught would represent a level of fishing mortality that exceeded the desired level of fishing mortality. If the appropriate levels of fishing mortality were exceeded, it is likely that stock rebuilding would be slowed. Under the No Action Alternative (with no TACs specified), it is possible that excessive harvest could occur for all three shared stocks. Since 2004, the U.S./Canada TACs have proved effective at controlling fishing effort on the shared stocks, in a precise manner, which would not be possible under the DAS system in place in the NE multispecies fishery at-large.

7.1.1.1.2 Commercial Fishery Effort Control Modifications

7.1.1.1.2.1 Option Two – Modification of Trip Limits

This option proposes to modify the trip limit for GOM cod to 800 lbs/DAS with a maximum of 4,000 lbs./trip. A trip limit for pollock is also adopted, at 1,000 lbs./DAS and 10,000 lbs./trip. These two trip limits will be implemented at the start of the fishing year. If Option 3 is also adopted (Section 3.2.2) the Regional Administrator may adjust the limits during the course of the fishing year to allow the ACL to be harvested or to reduce the likelihood that it will be exceeded. Finally, the yellowtail flounder trip limits applicable to limited access scallop vessels are removed. These changes will be discussed in order for their impacts on groundfish stocks.

Adopting the trip limit for reduces the amount of cod that the common pool vessels are able to land. The limit reduces, but does not eliminate, the difference between the ACL for the common pool and the potential landings from these vessels. The maximum landings if every DAS is used and the trip limit is caught on every DAS is reduced to about 1,306 mt, or roughly four times the ACL for the common pool vessels (based on September 1, 2009 sector rosters). This is less than the maximum landings under No Action: 3,266 mt. When compared to No Action, this alternative reduces the likelihood that the GOM cod ACL will be exceeded by common pool vessels.

The sector rosters, however, may change before the beginning of the fishing year since permits can be withdrawn from sectors until May 1, 2010. Some sense of the impacts of this proposed trip limit if permits do withdraw from sectors can be obtained by making assumptions about sector membership. While participation in sectors is likely based on a number of factors, if assumed that the decision is primarily based on the amount of GOM cod that can be caught the permits can be identified that have the potential to land more cod in the common pool than in sectors if the proposed trip limit is adopted. This assumption is likely not valid but does provide some idea of the effect of the trip limit under different levels of sector membership. With the proposed trip limit of 800 lbs./DAS, approximately 15,700 DAS would be expected to remain in the common pool if the decision was based solely on potential GOM cod landings. The resulting ACL for the common pool would be approximately 1,700 mt while the potential landings under DAS would be about 6,700 mt.

These simplistic calculations have several weaknesses. First, only baseline allocated DAS are used; there could be carry-over DAS that increase the number of DAS available to the fleet. The percentage of baseline DAS that do not get used – and thus are available as carry-over DAS in the following year – has averaged 16.7 percent since FY 2004, within a narrow range of 15.2 percent to 17.4 percent. Second, the analyses assume that the full GOM cod trip limit is caught on every DAS. This has never been the case; some DAS get used in other areas, and even for DAS used in the GOM the GOM cod trip limit is not caught on every DAS and on every trip. Second, the analysis assumes that every DAS is used. Again, this has never occurred. Information in Section 5.6.4 shows that DAS used as a percentage of all DAS allocated (baseline and carry-over DAS) has ranged between 62.6 percent and 67.6 percent since FY 2004. Even if only the DAS are considered that are allocated (or acquired through leasing) to permits that use DAS, the percentage of DAS used has been between 70 and 76 percent since FY 2004; a slowly increasing trend is evident.

If the observed trends in carry-over DAS continue, permits committed to the common pool would have about 4,600 DAS available. If the rate of use matches recent observations, about 65 percent would be used. Multiplying these values by the proposed trip limit results in potential landings of 1,093 mt, or about 16 percent less than the initial estimate.

Landings are only one source of fishing mortality; discards also contribute. One likely result of the 800 lb./trip limit is that GOM cod discards would remain high. Current stock size is projected to be close to, or perhaps even higher than, SSB_{MSY} (see Figure 25), yet the proposed trip limit is the same as that adopted in Amendment 13 when stock size was less than one-fourth the current projected stock size. There is evidence that discards of GOM cod increased with increases in stock size[5] in recent years (see Figure 38), and the ratio of cod discarded to cod landed has increased as well (see Figure 39). To the extent that regulatory discards of GOM cod are proportional to increases in stock size, discard rates for common pool vessels are likely to increase under this measure from recently seen values. Under the No Action alternative, the trip limit is larger, so regulatory discards resulting from the trip limit would likely be smaller; this measure would probably increase discards when compared to No Action as well.

This measure also adopts a pollock trip limit of 1,000 lbs./DAS and 10,000 lbs./trip. Under existing regulations and the No Action alternative there is no trip limit for pollock. This makes it difficult to do an analysis similar to that for GOM cod because it is not clear how much pollock the vessels in the common pool can catch absent a trip limit. As noted in Section 5.6.4 the vessels committed to the common pool as of September 1, 2009 only have small PSCs for pollock that total 4.31 percent, indicating they did not actively target this species during the qualification period. The pollock ACL for these vessels is about 118 mt, or 261,110 lbs. Unlike cod, pollock is a relatively low value species and large volumes are needed to be profitable. It is not clear if these identified common pool vessels will target pollock if a trip limit is not adopted, nor is it clear that other vessels will leave sectors based solely on potential pollock catches. Under No Action, there is no pollock trip limit and there would be an increased risk that pollock ACLs might be exceeded.

[5] Regulatory discards are presumed sensitive to trip limits. During the period described the trip limit for GOM cod was 800 lbs./DAS with the exception of May – November 2006 when it was reduced to 600 lbs./DAS.

Figure 38 – Commercial discards of GOM cod, CY 2004 – 2008. Values for 2008 are preliminary.

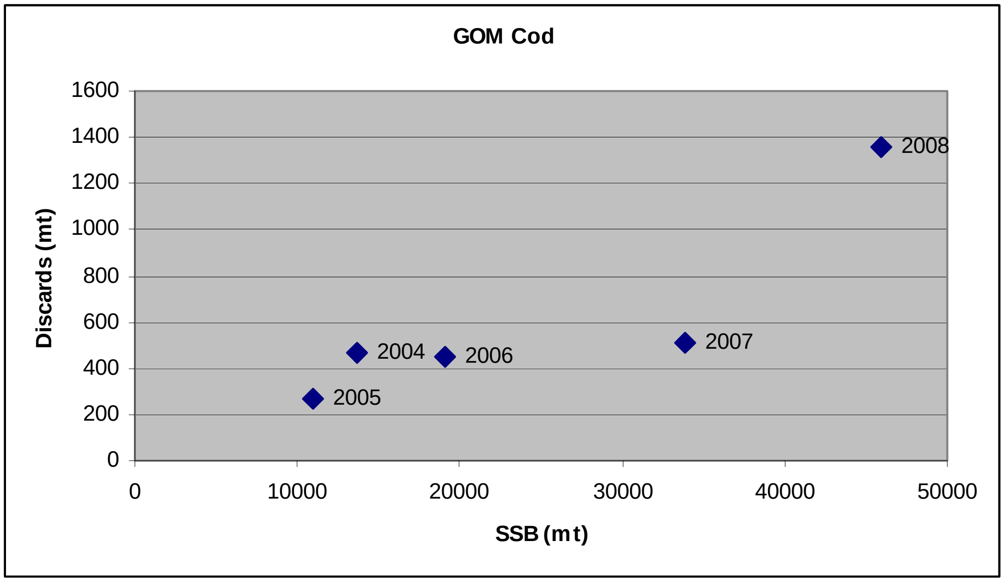
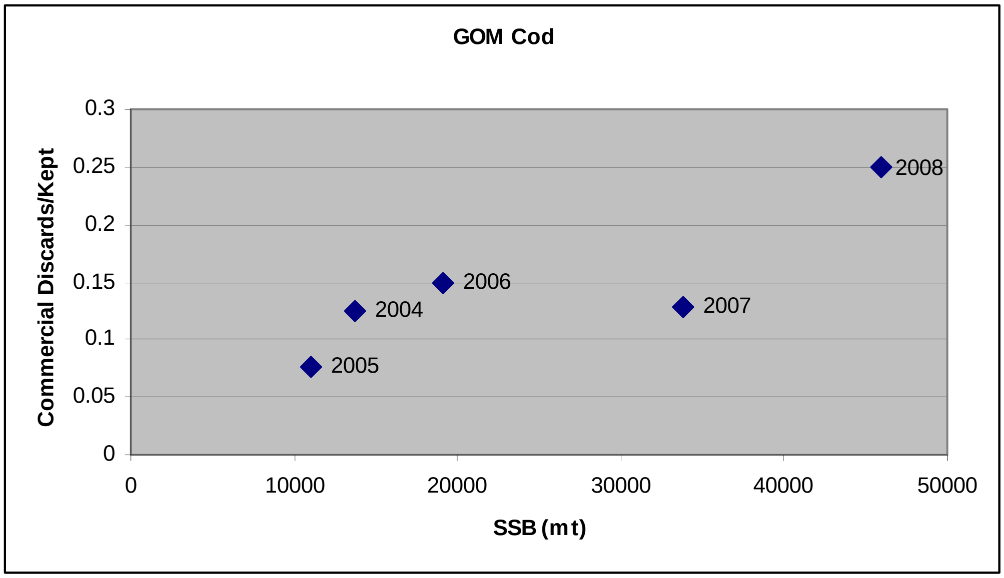


Figure 39 – Commercial discard/kept ratio for GOM cod, CY 2004 – 2008. Values for 2008 are preliminary.



The adoption of the pollock trip limit does cap the potential landings by common pool vessels at 1,632 mt if the trip limit is landed on all baseline DAS and all DAS are used. When carry-over DAS and DAS use rates are taken into account the landings are capped at 1,366 mt. Either value is well above the ACL for the common pool. And as is the case with GOM cod, these estimates do not consider discards. Analysis of this trip limit for Amendment 16 suggested that it would result in increased discards of pollock to 58 percent of landings.

This measure also proposes to remove the yellowtail flounder trip limit for limited access scallop vessels and require them to land all legal-sized yellowtail flounder. Adopting this requirement should reduce discards of yellowtail flounder as compared to No Action – almost all yellowtail flounder caught by limited access vessels is presently discarded. Recent discards are summarized below.

If this measure merely converts existing discards to landings, fishing mortality on yellowtail flounder would not increase from this change and there would be no change in yellowtail mortality when compared to No Action. A review of observer data shows that average catches (landings and discards) by scallop dredge vessels are usually below 300 lbs. for limited access vessels and are less than 50 lbs/ for general category vessels (Table 84). If scallop vessels – which have considerably reduced yellowtail flounder bycatch in recent years through gear modifications and revised management measures – decide to take advantage of this change and actively target yellowtail flounder then mortality targets may not be achieved. This is more of a concern in FY 2010 when the scallop catch of yellowtail flounder is not a sub-ACL and is not subject to scallop fishery AMs. It would be more of an issue if the proposed measure applied to the General Category Scallop fleet, which it does not. These vessels are limited to landing 400 lbs. of scallop meat weights per trip and do not have DAS restrictions. At a price of $7.50/lb., scallop revenues per trip are $3,000. A relatively modest amount of yellowtail flounder at $1.50 per pound may provide enough revenue to encourage targeting behavior. Yellowtail flounder revenues will likely be less attractive to limited access scallop vessels landing on the order of 15,000 – 18,000 lbs. of scallop meat weights worth $112,500 - $135,000 per trip.

Requiring scallop vessels to land these fish may have ancillary benefits. Discard estimates are subject to error. To the extent that vessels comply with the requirement, better estimates of scallop vessel catches of yellowtail flounder should result thatn those under No Action.

Other biological impacts may result from the combination of this measure and the scallop fishery access area program. Again, if fishing behavior is not altered as a result of this measure, catches within the access area should not change and discards will be converted to landings. But if the vessels choose to take advantage of this regulation and target yellowtail flounder then when compared to No Action catches could increase and if this occurs in the access areas it may reduced the contribution of those areas to groundfish rebuilding. This could be an issue for CAII. Recent assessments indicate that the GB yellowtail flounder stock is heavily concentrated in this area. To the extent that the area is providing benefits to rebuilding by serving as a refuge for yellowtail flounder, increased targeting by any vessels in this area may slow rebuilding. It is not clear, however, that the area is serving in this fashion.

Changes in the GOM cod and pollock trip limits are not expected to have direct biological impacts on other species when compared to No Action. It is possible that the common pool groundfish vessels may modify behavior to catch other non-groundfish species to replace revenues lost because of the reduced trip limits. But the number of common pool vessels (based on September 1, 2009 sector rosters) and the limited DAS available to them make it unlikely that these measures will have substantial effects on fishing mortality for stocks such as skates and monkfish.

Table 84 – Number of observed trips and average yellowtail flounder caught per trip (2009 through July)

YEAR	PROGRAM	Limited Access Trips Observed	General Category Trips Observed	Total Trips Observed	Average YTF/Trip Limited Access (lbs.)	Average YTF/Trip General Category (lbs.)
2007	Open	25	19	44	230	5
	Train	2	6	8	0	6
	Turtle Chain	52	9	61	322	23
	NLCA	25	51	76	74	7
	CAI	33	18	51	107	16
	HUDS	35		35	2	
	ELF	53	2	55	1	0
2007 Total		225	105	330	125	9
2008	Open	42	13	55	222	4
	Train	8	5	13	82	0
	Turtle Chain	83	10	93	226	8
	NLCA	35	106	141	146	8
	CAI	2		2	179	
	HUDS	6		6	0	
	ELF	189	142	331	1	0
2008 Total		365	276	641	94	4
2009	Open	37	16	53	68	21
	Train	3		3	177	
	Turtle Chain	53	11	64	237	2
	CAII	23		23	1162	
	ELF	100	111	211	0	0
	DELMARVA	18	32	50	0	0
2009 Total		234	170	404	181	2
Grand Total		824	551	1375	127	4

7.1.1.1.2.2 Option 4 – Effort Control Measure Adjustments

This measure authorizes the Regional Administrator to adjust trip limits or DAS counting rates during the fishing year in order to facilitate harvesting the ACL or to reduce the likelihood the ACL is exceeded. Since sector membership will not be known with certainty until May 1, 2010, there is more uncertainty about the effectiveness of the effort control measures than with prior management actions. This uncertainty is bound in scope by the number of vessels in the common pool that will fish, which is expected to be relatively few, based on the September 2009 rosters. This option gives the Regional Administrator two tools that can be readily used should the measures prove to be misaligned with fishing activity in the common pool. The result is that there should be more certainty about maintaining catch at or below the applicable ACLs, increasing the likelihood that fishing mortality targets will be achieved when compared to No Action.

There is evidence in recent groundfish management that suggests this measure can be effectively applied. The Regional Administrator has effectively used authority to modify trip limits and other measures to control the catch of GB yellowtail flounder under the provisions adopting the U.S./Canada Resource Sharing Understanding.

As for impacts of this measure on fishing mortality for non-groundfish species, this could result in an increase when compared to No Action if the Regional Administrator chooses to make groundfish management measures more restrictive. Groundfish fishing vessels may be forced into other fisheries to replace lost revenues. The ability to redirect effort will be limited by the type of in-season changes that are made. If the Regional Administrator increases DAS counting rates, then the ability to redirect effort into skates or monkfish fisheries would be limited because generally vessels must use DAS to participate in those fisheries. Trip limit changes would not similarly prevent effort shifts. If measures are made less restrictive, it may draw effort away from other fisheries and reduce fishing mortality on other stocks.

7.1.2 Biological Impacts of Alternatives to the Proposed Action

7.1.2.1 ACL Specifications – Impacts on Groundfish Stocks

7.1.2.1.1 Option One – No Action

The No Action alternative described in section 4.1.1considers that M-S Act requirements mandate the implementation of ACLs in FY 2010 for stocks that are subject to overfishing. As a result, it is likely that NMFS would implement these provisions through either an interim or emergency action. While NMFS may implement ACLs at some level in order to meet statutory requirements, the agency is not likely to make allocation decisions typically considered the purview and responsibility of the Council. This may include the determination of adjustments to the ABC for management uncertainty, any changes to the distribution of available catch to fishery sub-components, and the allocation of yellowtail flounder between the groundfish and scallop fisheries. This is the assumption used to evaluate the biological impacts of the No Action alternative. Absent a clear statement of how NMFS would act, this seems the prudent course to follow, but this may over-estimate the negative biological impacts of the No Action alternative.

The No Action alternative assumes that NMFS will use the ABCs recommended by the Council's Science and Statistical Committee (SSC) as the limits on catch, or ACLs. The impacts on stock size of limiting catch to these levels can be estimated for stocks with age-based assessments and projections. Projection assumptions are fully described in Appendix III, and projection output is provided in Appendix IV. These projection results are shown in Figure 24 through Figure 37. On the surface, there is no difference between Option I - No Action and Option Two – Proposed Specifications with respect to future stock sizes. Because No Action considers that the ACL may be set equal to the ABC, however, there is less certainty about future stock size. Without an ACL adjustment for management uncertainty, AMs may not be triggered in time to keep catch below the ABC, or to modify future measures to account for an overage of the ABC/ACL.

Under No Action, a specific allocation of yellowtail flounder would not be made to the groundfish and scallop fisheries because while Amendment 16 proposes such an allocation the values are not specified. The only fishery catching yellowtail flounder that would be subject to an

ACL and AM would be the groundfish fishery. The alternative assumes that NMFS would not determine a set-aside or assumed scallop fishery catch, so all of the yellowtail flounder would be allocated to the groundfish fishery, state waters, or other sub-components. That portion of the fishery subject to hard TACs (i.e. sectors beginning in FY 2010 and the common pool in FY 2012) might have a TAC allocated that does not consider yellowtail flounder catches by the scallop fishery. This increases the likelihood that the catch of yellowtail flounder may exceed the ABC if the part of the fishery subject to hard TACs catches its full allocation and scallop catches are as estimated. Overfishing of yellowtail flounder is likely to result, which would threaten the rebuilding plans for the three stocks. This would be particularly problematic for GB and SNE/MA yellowtail flounder, the two stocks where successful rebuilding seems to be most at risk given the Council's current rebuilding progress and the selected rebuilding strategies.

The No Action alternative would not adopt U.S./Canada Resource Sharing Understanding TACs for FY 2010. Such TACs are developed by the Transboundary Management Guidance Committee, or TMGC. While the TMGC agreed to FY 2010 TACs for EGB cod and haddock, the group did not reach agreement for GB yellowtail flounder.

Under the U.S. management system, EGB cod and EGB haddock are a subset of the GB cod and haddock stocks that are assessed as a unit. EGB cod and EGB haddock are considered management units and not separate stocks; target catch levels (such as the ABC) for the U.S. fishery are based on the mortality requirements for the stock as a whole. Failure to adopt the U.S./Canada TACs for these two stocks thus affects where catch might be taken – since there is no limit on the catch from the U.S./Canada area – but should not affect overall catches unless no provision is made for the Canadian portion of the catch. This is most problematic for components of the fishery subject to hard TACs, since if Canadian harvests are ignored the TACs would be set too high and would likely lead to overfishing. For components of the fishery subject to effort controls, if the relative proportions caught by the Canadian and U.S. fisheries remain similar to recent shares then the effort controls should be correctly designed to control fishing mortality. There would be less certainty about achieving mortality targets for these two stocks since no part of the catch would be controlled by a hard TAC.

With respect to GB yellowtail flounder, the entire stock is subject to the U.S./Canada Resource Sharing Understanding. No agreement was reached by the TMGC for this stock. Under No Action a specific TAC would not be specified by the U.S. This means that the stock could not be managed with a hard TAC as has been the case since FY 2004. This hard TAC has been effective at controlling catches but overfishing still occurred in 2005 through 2008 because of assessment uncertainty. Under the No Action alternative there would be less certainty about controlling catches but this may or may not lead to more uncertainty about achieving mortality targets.

For all three stocks, it is not clear how the Canadian management authorities would react to the U.S. not implementing the TMGC recommendations as would occur under No Action. If Canadian authorities were to follow suit and not limit Canadian fishery catches to the TMGC levels, then the likelihood of overfishing increases. This could also threaten future agreements over catch levels and lead to longer term rebuilding problems.

7.1.2.1.1.1 Sub-option 1 - Yellowtail Flounder Allocation to the Scallop Fishery

This option also allocates a portion of the yellowtail flounder ACL to the scallop fishery to account for incidental catches in that fishery. It differs from the Proposed Action in that in FY

2010 the scallop fishery is assumed to catch only 90 percent of the GB and SNE/MA yellowtail flounder they are expected to harvest.

The biological impacts of this option are similar to the Proposed Action (see section 6.1.1.1.1.1). The only difference is in FY 2010 when the scallop fishery is assumed to harvest less yellowtail flounder. Since there are no AMs in place, nothing limits the scallop fishery to this amount.

In FY 2010, as mentioned, the yellowtail flounder allocations do not have specific AMs that control the overall yellowtail flounder catch. If the scallop fishery fishes in CAI, CAII, or the NLCA, it is limited to harvesting 10 percent of the ACL from within those areas, but there are no controls on the catch outside those areas. Should the scallop fishery exceed the amount of yellowtail flounder that is allocated, then if the groundfish fishery harvests its allocation the total catch of yellowtail flounder could exceed the ACL. While the ACL is set well below the overfishing level for both stocks and it is unlikely that total catches will approach this amount, rebuilding fishing mortality targets may not be met since the ACL is set closer to the ABC.

This result is less likely in subsequent years. While the exact scallop fishery AMs are still being developed, these AMs will create an incentive for scallop fishermen to control yellowtail flounder catches to avoid triggering the AMs. The result may be reduced catches of yellowtail flounder by the scallop fishery.

The impacts of this measure in FY 2011 and FY 2012 are similar to the Proposed Action.

<u>Impacts on Non-Groundfish Stocks</u>
Impacts on other stocks are similar to those of the Proposed Action. The allocation of yellowtail flounder to the scallop fishery will have the most direct impacts on scallop stocks. If scallop fishermen cannot control the rate of incidental catches to the amount of yellowtail that is allocated, some scallop yield will be foregone. This could reduce fishing mortality on sea scallops. The extent that this occurs will depend not only on actual discard rates, but on what AMs are in place for the scallop fishery in future years. Estimates are that the scallop fishery will forego approximately 2,100 mt of scallop yield (meat weight) in FY 2011 and 1,700 mt of scallop yield in FY 2012. It is expected these reductions will likely occur in open areas rather than access areas.

There may also be impacts on other stocks caught in the sea scallop and groundfish fisheries. For example, if sea scallop fishing activity is reduced because of yellowtail flounder incidental catches, catches of skates, monkfish, and other species caught by scallop fishermen may be reduced. Similar effects on a wider range of species may occur if the groundfish fishery loses effort as a result of allocating yellowtail flounder to the scallop fishery. Catches could be reduced of monkfish, skates, lobster, fluke, and other species caught by trawl fishermen.

7.1.2.2 Commercial Fishery Effort Control Modification

7.1.2.2.1 Option One – No Action

Under the No Action alternative, the effort control measures adopted by Amendment 16 would apply to common-pool groundfish fishing vessels – that is, those that do not join a sector. These measures were evaluated in Amendment 16 to meet the mortality targets of the amendment. The expected changes in exploitation for groundfish stocks are shown in Table 85.

Table 85 – Option 3A changes in exploitation (needed difference for pollock reflects impacts of changes to the Category B regular DAS program)

Spec	AREA	Needed Difference	Amendment 16 Impacts % Difference
COD	GBANK	-50%	-54%
COD	GM	-37%	-52%
HADDOCK	GBANK	202%	-53%
HADDOCK	GM	24%	-54%
WINTER	GBANK	48%	-52%
WINTER	GM		-45%
WINTER	SNEMA	-100%	-67%
PLAICE	ALL	39%	-56%
WITCH	ALL	-46%	-56%
WHK	ALL	28%	-63%
WINDOWPANE	NORTH		-59%
WINDOWPANE	SOUTH		-61%
YTF	CCGOM	-34%	-57%
YTF	GBANK	-15%	-59%
YTF	SNEMA	-39%	-39%
POLLOCK	ALL	-66%	-61%
REDFISH	ALL	271%	-62%

As discussed in Amendment 16, these expected impacts were estimated using an analytic tool referred to as the Closed Area Model (CAM). Because of uncertainty over sector membership, analyses in Amendment 16 assumed all permits remained in the common pool and would be subject to effort controls. Throughout the development of Amendment 16 it was clear that the development of effort controls was more uncertain than in the past because it was not known which vessels would choose to join sectors and which vessels would choose to fish under the effort controls. If the vessels that choose to fish in the common pool are not representative of the vessels in the model, then the model results might not accurately predict impacts. The ability to model the 24-hour clock added additional uncertainty. Concerns have been expressed that the model over-estimates the exploitation reductions, in particular for GOM cod and pollock. Another source of uncertainty is the estimate of cod discards. The Closed Area Model (CAM) parameters reflect revealed preferences based on catch rates in gear/block/month combinations. If catch rates in the model are lower than actual catch rates due to low estimates of discards, then some areas may be seen as less favorable within the model than is actually the case, and the model may over-estimate changes in exploitation. When the effort control alternative was developed there was a considerable buffer between the needed changes in exploitation for GOM cod and the model's predicted results, but this gap was essentially eliminated when the Council adopted the revised ABC control rules.

Based on sector rosters as of September 1, 2009, a large number of permits have been committed to sectors. These commitments can still be reversed until May 1, 2010, so sector membership is still not known with certainty. The permits that have not committed to sectors are described in Section 5.6.4. Given the trip limits adopted by Amendment 16 for GOM cod (2,000 lbs./DAS) and pollock (no trip limit), these permits have the potential to catch more GOM cod and pollock under effort controls than within sectors. There may be other permits that are presently committed to sectors that may be able to do the same. While the decision to join sectors does not hinge solely on these two species, the possibility that other permit holders may elect to fish in the common pool adds uncertainty to the success of the effort control measures.

An example for GOM cod illustrates the potential issue should the No Action alternative be adopted. With 3,600 DAS in the common pool and a 2,000 lb./DAS trip limit, if the full trip limit is caught on every DAS the vessels that are not committed to sectors could land 3,266 mt of GOM cod. By comparison, the ACL for these same vessels is approximately 337 mt. While it is unrealistic to assume the trip limit will be caught on every DAS used, and that every DAS will be used, there remains a large difference between the ACL and the potential catch of these vessels. Should additional vessels choose to remain in the common pool, the potential catch increases, but so does the common-pool ACL.

To the extent fishing behavior changes in ways not predicted by the CAM and other analyses in Amendment 16, there may be less certainty about achieving the mortality objectives of Amendment 16 if the No Action alternative is selected.

7.1.2.2.2 Option Three – Modification to DAS Counting

This measure proposes to count common-pool vessel DAS at a 2:1 rate in the GOM differential DAS area at the beginning of the fishing year. This measure will reduce fishing effort by common pool vessels in this area. In recent years nearly 92 percent of GOM cod landings came from this area, so the measure would be expected to have the most impact on this stock. But it would also reduce fishing mortality from common pool vessels on other stocks caught form this area, including GOM haddock, pollock, plaice, CC/GOM yellowtail flounder, and GOM winter flounder.

With respect to the potential landings of GOM cod by vessels committed to sectors as of September 1, 2009, the maximum impact of this measure would occur if these vessels used all their DAS in the differential DAS area. Effectively this would reduce the potential landings in half, or to 1,633 mt if every baseline DAS is used. When combined with the proposed 800 lbs./DAS trip limit the results show a larger decline. If 3,600 baseline DAS are used, the potential landings are 653 mt. with the two combined measures. When carry-over DAS are incorporated into the analysis, and if only 65 percent of available DAS are used, then the potential landings are 546 mt.

Unlike a revised trip limit, this measure is not likely to lead to increased discards of GOM cod or pollock. One possible adverse impact could occur if common pool vessels shift fishing operations into other areas and fish on weaker stocks. This could occur either through the permit holders actually fishing in other areas or if they lease their DAS to vessels fishing in other areas. For example, if effort moves onto GB cod it could make it more difficult to reduce fishing mortality on that stock. There would be similar concerns if the effort shifted to SNE/MA yellowtail flounder.

7.2 Impacts to EFH

7.2.1 Impacts to EFH of the Proposed Action

7.2.1.1 ACL Specifications

7.2.1.1.1 Fishery Specifications and ACLs for FY 2010 – FY 2012

Under this option, ACLs are specified for FY 2010- 2012, a specific allocation of yellowtail flounder is made to the scallop and groundfish fisheries (a slight modification to non-selected Sub-Option One), and the U.S./Canada TACs are specified for FY 2010 (Sub-option Three). The Regional Administrator will establish the TAC for the CAI Hook Gear Haddock SAP in accordance with the Administrative Procedures Act. This will occur under either the Proposed Action or under the No Action alternative because this measure was adopted in an earlier action.

Habitat Impacts
The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on essential fish habitat. The ACLs are consistent with the fishing mortality targets adopted by Amendment 16. These targets form the basis for the effort controls that apply to the common pool vessels and the amount of catch that can be taken by vessels that join sectors. Under the Proposed Action, the ACLs are set below the ABC. While this would have no impact on the common pool fleet in FY 2010 – because the effort controls do not change as a result of the ACL process – it reduces fishing opportunities for sector vessels when compared to the No Action alternative, since they are limited by a hard TAC. So indirectly, when compared to the No Action, this option could lead to a minor decrease in fishing effort and reduce the interactions of groundfish fishing gear with EFH. Since the common pool ACL would also be slightly lower, the differential DAS AM might allow slightly fewer fishing opportunities in FY 2011 if the ACL is exceeded. These impacts are speculative, however, as it is not entirely clear how the major management changes adopted by Amendment 16 will affect fishing operations.

Setting the CAI Hook Gear Haddock SAP is largely administrative and is not expected to result in any habitat impacts. The SAP itself, however, does provide opportunities for longline fishermen to target GB haddock and may increase the proportion of the haddock catch taken by fixed gear rather than mobile gear. No difference is expected between the Proposed Action and the No Action alternative as the measure is identical.

Sub-Option One adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. For FY 2010 there is a negligible difference between this option and No Action when considering the scallop fleet. The allocation is 100 percent of the amount they are expected to harvest, so there are not likely to be any differences in the amount of scallop fishing effort in this year. In FY 2011 and FY 2012, however, the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. When compared to No Action, this option may indirectly reduce scallop fishing effort by a small amount and as a result slightly reduce the interaction of scallop dredge gear with EFH.

The same changes may take place in the groundfish fishery. For sector vessels, reduced access to yellowtail flounder may immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for EFH are likely to be positive but minor. This provision only affects a small portion of the groundfish fleet, and yellowtail flounder fishing usually does not occur on complex, sensitive habitats.

Sub-Option two adopts TACs for EGB cod and haddock, and GB yellowtail flounder, as required to implement the U.S./Canada Resource Sharing Understanding. While these TACs do not modify overall catches of these species by U.S. fishermen (because they are a subset of the overall ACL), they do limit fishing activity in the Eastern U.S./Canada area. The triggering of management measures to prevent the TAC for cod or haddock in the Eastern U.S./Canada Management Area from being exceeded could result in fishing effort being re-directed to yellowtail flounder in the Western U.S./Canada Area. If the yellowtail flounder TAC is reached first, the Eastern U.S./Canada Area would close, and possession of yellowtail flounder would be prohibited, but multispecies vessels could still continue to fish for various groundfish in the Western U.S./Canada Area. It is important to note that in addition to the habitat impacts that are related to changes in fishing effort associated with this action, other factors such as the type of habitat, its vulnerability to disturbance, the degree of natural disturbance, and the degree to which the habitat is already being impacted by bottom-tending mobile gear used in other fisheries, are also relevant. Benthic habitats in the U.S./Canada Management Area are impacted by fishing activities that are not affected by this management action, primarily scallop dredging. They are also exposed to natural disturbances caused by bottom currents and storms. Scallop dredging on eastern GB would continue even if the TAC for cod, yellowtail flounder, or haddock is reached. Trawlers utilizing monkfish DAS could also continue fishing in the area once it was closed to vessels using multispecies DAS. Adverse EFH impacts of all fishing activities managed by the New England Fishery Management Council were minimized to the extent practicable in management actions implemented in recent years.

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. This proposed 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 proposed action does 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 it continues to minimize the adverse impacts of bottom trawling and dredging on EFH.

7.2.1.2 Commercial Fishery Effort Control Measures

7.2.1.2.1 Option Two – Trip Limit Modifications

This option adopts a 800 lb./DAS – 4,000 lb./trip limit for GOM cod, a 1,000 lb./DAS- 10,000 lb./trip limit for pollock, and requires limited access scallop vessels to land legal-sized yellowtail flounder. It also retains the trip limits for Handgear A permits at 300 lbs. cod and Handgear B permits at 75 lbs. cod.

Habitat Impacts
The adoption of reduced trip limits for GOM cod and pollock may alter the distribution of fishing effort by common pool vessels, particularly in the Gulf of Maine. Both stocks are caught widely throughout the area, though in recent years GOM cod catches have primarily been taken in inshore areas. The impacts of these changes in effort are difficult to predict. Both stocks can be caught over hard, complex bottom, so if effort is reduced in these areas it may provide some minor benefits to EFH. But without knowing how fishermen will change behavior these effects cannot be certain. When compared to No Action, it is doubtful that these reduced trip limits will have anything other than negligible impacts on EFH.

It is assumed the handgear used by Handgear A and B permit holders does not have habitat impacts, and thus the trip limit change is not expected to have any impacts on EFH as a result. There would not be any difference between the Proposed Action and No Action.

Requiring scallop vessels to land legal-size yellowtail flounder is not likely to have any impacts on EFH as compared to the No Action alternative. The scallop fishery has worked to reduce incidental catches of yellowtail flounder. Many of these efforts have been codified into the regulations – for example, the use of ten inch twine tops. Given these gear requirements, and the low value of yellowtail flounder relative to the high value of scallops, it is not likely that scallop vessels will modify fishing behavior as a result of this change. There are incentives to avoid yellowtail flounder, since catching too many yellowtail flounder may trigger AMs that restrict access to the far more valuable scallops. The distribution of scallop fishing activity is unlikely to be any different than that under the No Action alternative.

7.2.1.2.2 Option Four – Effort Control Measure Adjustments

This measure authorizes the regional Administrator to make changes to DAS counting or trip limits to either reduce the likelihood an ACL will be exceeded, or to facilitate harvesting an ACL.

Habitat Impacts
This measure is administrative in nature and is unlikely to have impacts on EFH. Specific applications of this measure by the Regional Administrator could change the distribution or amount of fishing effort, but any such changes would be designed to achieve Amendment 16 mortality targets and the resulting ACLs. As such, it should not have habitat impacts beyond those described in Amendment 16. As such it would not differ from No Action.

7.2.1.3 Summary of Essential Fish Habitat Impacts of the Proposed Action

Overall, the impacts on EFH from the Proposed Action are expected to be neutral relative to the No Action alternative.

Table 86 – Expected EFH Impacts of the Proposed Action Relative to the No Action Alternative

Proposed Measure	Expected Relative Habitat Impacts	Rationale
Specification of ACLs	0	Primarily administrative with no direct impacts on EFH; may lead to very minor positive impacts compared to No Action because catches will be less than those under No Action.
Allocation of yellowtail flounder to the scallop and groundfish fisheries	+/0	May result in slightly less scallop dredge effort in FY 2011 – 2012 as compared to No Action, and slightly lower groundfish fishing effort. No significant impacts on EFH expected.
Specification of US/Canada area TACs	0	Compared to No Action, possible minor shifts in location of groundfish fishing effort as a result of measures designed to keep catches below these TACs, but no adverse effects expected.
Trip Limit Modifications	0	Minor changes in distribution of common pool groundfish fishing effort possible, but uncertain habitat effects. No impacts from changes to handgear trip limits as gear has little impact on EFH. Scallop fishing effort unlikely to change as a result of requirement for limited access vessels to retain yellowtail flounder.
Effort Control Measure Adjustments	0	Administrative measure. Any use of this authority would be consistent with mortality targets of Amendment 16 and any impacts to EFH should be the same as those described in the amendment.

7.2.2 Impacts to EFH of Alternatives to the Proposed Action

7.2.2.1 ACL Specifications

7.2.2.1.1 Option One – No Action

Under this option, ACLs would not be specified for FY 2010- 2012, a specific allocation of yellowtail flounder would not be made to the scallop and groundfish fisheries, and the U.S./Canada TACs would not be specified for FY 2010.

Habitat Impacts
The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on essential fish habitat. The ACLs are consistent with the fishing mortality targets adopted by Amendment 16. These targets form the basis for the effort controls that apply to the common pool vessels and the amount of catch that can be taken by vessels that join sectors. As the No Action alternative is defined, the ACLs would be set at the ABC level which would allow for slightly larger catches to be taken by the groundfish fishery. While this would have no impact on the common pool fleet in FY 2010 – because the effort controls do not change as a result of the ACL process – it would allow sector vessels more fishing opportunities, since they are limited by a hard TAC. So indirectly, when compared to the Proposed Action, this option could lead to a very minor increase in fishing effort and increase the interactions of groundfish fishing gear with EFH in FY 2010. Since the common pool ACL would also be slightly higher, the differential DAS AM might allow slightly more fishing opportunities in FY 2011 if the ACL is exceeded.

The No Action alternative also does not specify a specific allocation of yellowtail flounder for the groundfish and scallop fisheries. The No Action alternative, however, maintains the existing cap on the scallop fishery catches of yellowtail flounder in the CAI, CAII, and NLCA access areas. Without an overall cap on yellowtail flounder catches, scallop fishing activity would not be constrained by yellowtail flounder catches (but would continue to be limited by scallop management plan measures). When compared to the Proposed Action, this could lead to an increase in scallop fishing activity in FY 2011 and FY 2012 in the areas outside the CAI, CAII, and NLCA access areas, since fishing in these areas would still be limited by the cap. This might result in increased interactions between EFH and scallop dredge activity, but ultimately these interactions would be consistent with the analysis of impacts in the scallop management actions.

If U.S./Canada TACs are not specified, there may be changes in the distribution of fishing activity on GB. In recent years the TACs have occasionally restricted access to the Eastern U.S./Canada area; without the TACs, these restrictions would not be implemented and as a result there may be more fishing effort in the eastern area. It is not clear whether catch rates in the eastern area would be higher than in the western area, leading to more fish being caught with less effort.

The CAI Hook Gear Haddock SAP TACs would be the same under No Action as in the Proposed Action. This measure is largely administrative in nature and no impacts on EFH are anticipated.

Overall, the indirect impacts of this No Action alternative are expected to be minor, and may be negative.

7.2.2.1.2 Option Two - Fishery Specifications and ACLs for FY 2010 – FY 2012

This option differs slightly from the Proposed Action in that GB and SNE/MA yellowtail flounder allocated to the scallop fishery in FY 2010 is 90 percent of the amount expected to be caught, rather than 100 percent. Because this value does not trigger a specific AM in FY 2010 and is only marginally smaller than that proposed, the habitat impacts of this option would be expected to be indistinguishable from those described for the Proposed Action (see section 6.2.1.1.1).

7.2.2.2 Commercial Fishery Effort Control Measures

7.2.2.2.1 Option One – No Action

Under this option, the effort control measures that are proposed in Amendment 16 would remain in effect and would not be changed. The impacts on EFH are described in that action. No changes would be expected.

7.2.2.2.2 Option Three - Modification to DAS Counting

This option proposed to adopt differential DAS counting at the rate of 2:1 for an area in the inshore GOM in order to reduce catches of GOM cod and pollock by vessels that do not join sectors.

Habitat Impacts
In general, reductions in DAS reduce groundfish fishing and thus reduce potential adverse effects of fishing on EFH. The impacts of differential DAS counting may not be as clear. Imposing this rate in the inshore GOM area may reduce effort in that area, but the effort could shift into other areas as a result. The ability of vessels to do this are limited to some extent by the fact that the boats that fish in the inshore GOM tend to be smaller vessels that typically take one or two day trips; their ability to fish in offshore areas is limited. These vessels also are most familiar with targeting species found in the inshore GOM, such as GOM cod and pollock, so moving to other inshore areas where these species are not frequently found may not be attractive to them. A second factor limiting the potential benefits to habitat of this measure is that it only applies to vessels that choose to remain in the common pool; based on September 1, 2009 sector rosters, this is likely to be only a small number of active fishing vessels. Overall, this measure may have provided minor, positive impacts for habitat in the inshore GOM area.

7.3 Impacts on Endangered and Other Protected Species

7.3.1 Impacts on Endangered and Other Protected Species of the Proposed Action

7.3.1.1 ACL Specifications

7.3.1.1.1 Fishery Specifications and ACLs for FY 2010-2012

Under this option, ACLs are specified for FY 2010- 2012, a specific allocation of yellowtail flounder is made to the scallop and groundfish fisheries (a slight modification to non-selected Sub-Option One), and the U.S./Canada TACs are specified for FY 2010 (Sub-option Three). The Regional Administrator will establish the TAC for the CAI Hook Gear Haddock SAP in accordance with the Administrative Procedures Act. This will occur under either the Proposed Action or under the No Action alternative because this measure was adopted in an earlier action.

Impacts to Protected Species
ACL specifications are largely administrative measures and are therefore not expected to have direct impacts on protected species. The ACLs in the Proposed Action are consistent with the fishing mortality targets adopted by Amendment 16. These targets were used to determine the effort controls that apply to the common pool vessels and the overall catch that can be harvested by sector vessels. Under the Proposed Action, the ACLs are set below the ABC. While this would have no impact on the common pool fleet in FY 2010 – because the effort controls do not change as a result of the ACL process – it reduces fishing opportunities for sector vessels when compared to the No Action alternative, since they are limited by a hard TAC. Indirectly, when compared to the No Action, this option could lead to a minor decrease in fishing effort and create a benefit for protected species by reducing their interactions with groundfish fishing gear. Since the common pool ACL would also be slightly lower, the differential DAS AM might be triggered if the ACL is exceeded and allow slightly less fishing opportunities in FY 2011. These impacts are uncertain, however, as it is not entirely clear how the major management changes adopted by Amendment 16 will affect fishing operations.

Setting the CAI Hook Gear Haddock SAP is largely administrative and is not expected to result in any protected species impacts. The SAP itself, however, does provide opportunities for longline fishermen to target GB haddock and may increase the proportion of the haddock catch taken by fixed gear rather than mobile gear. Although hook gear has been known to interact with sea turtles, Amendment 16 points out that the timing and location of the CAI make it unlikely that sea turtle interaction would increase. Similarly, right whale critical habitat does fall in the area, however hook gear has not been implicated in entanglements. No difference is therefore expected between the Proposed Action and the No Action alternative.

Sub-Option One adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. For FY 2010 there is a negligible difference between this option and No Action when considering the scallop fleet. The allocation is 100 percent of the amount they are expected to harvest, so there are not likely to be any differences in the amount of scallop fishing effort in this year. This would likely mean that the impact to protected species would be negligible. In FY 2011 and FY 2012, however, the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. When compared to No Action, this option may indirectly reduce scallop fishing effort by a small amount and as a result slightly reduce the interaction of scallop dredge gear with protected species. More specifically, scallop dredges have been known to interact largely with sea turtles, therefore sea turtles are most likely to benefit from this action.

The same changes may take place in the groundfish fishery. For sector vessels, reduced access to yellowtail flounder may immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for protected species are likely to be positive but minor, as the possibility of interaction with the fishery decreases. This provision only affects a small portion of the groundfish fleet however the benefits have the possibility of being felt by a range of protected species.

Sub-Option two adopts TACs for EGB cod and haddock, and GB yellowtail flounder, as required to implement the U.S./Canada Resource Sharing Understanding. While these TACs do not modify overall catches of these species by U.S. fishermen (because they are a subset of the overall ACL), they do limit fishing activity in the Eastern U.S./Canada area. The triggering of management measures to prevent the TAC for cod or haddock in the Eastern U.S./Canada Management Area from being exceeded could result in fishing effort being re-directed to yellowtail flounder in the Western U.S./Canada Area. If the yellowtail flounder TAC is reached first, the Eastern U.S./Canada Area would close, and possession of yellowtail flounder would be prohibited, but multispecies vessels could still continue to fish for various groundfish in the Western U.S./Canada Area. The uncertainty associated with the these shifts in effort, however, makes it difficult to calculate the amount of impact that the Option may have on protected species, from impacts such as forage availability to encounters with fishing vessels. It is therefore unknown at this time. Consequently, while management overall has been viewed as a benefit to protected resources inhabiting the management area, the impact of the Option cannot be predicted at this time. That being said, any specifications which limit effort have the potential to benefit protected species in some way.

This proposed action makes relatively minor adjustments in the context of the fishery as a whole. As the industry adapts to additional restrictions in effort on some species, and increased opportunity to fish for others, the pattern of effort will determine the fisheries' interaction with protected species relative to its current level. The impact of the proposed measures on protected species are difficult to predict with great precision because it is unclear how fishermen will adapt to new restrictions on some activities and increased opportunities in other areas. Overall interactions with protected species are not expect to change drastically, and the impact of this measure will be minimal.

Formal consultation under Section 7 of the ESA was reinitiated by NMFS and is ongoing for the NE Multispecies FMP. NMFS determined that continued operation of the FMP during the consultation period, as authorized by NMFS, will neither jeopardize the continued existence of endangered and threatened species, nor destroy or adversely modify designated critical habitat.

7.3.1.2 Commercial Fishery Effort Control Modifications

7.3.1.2.1 Option Two – Trip Limit Modifications

This option adopts a 800 lb./DAS – 4,000 lb./trip limit for GOM cod, a 1,000 lb./DAS- 10,000 lb./trip limit for pollock, and requires limited access scallop vessels to land legal-sized yellowtail flounder. It also retains the trip limits for Handgear A permits at 300 lbs. cod and Handgear B permits at 75 lbs. cod.

Impacts to Protected Species
The option, in general decreases the number of pounds caught, and as such has ability to alter interactions with protected species. Although minor changes in the impact are likely, the changes will most likely be beneficial. With less pounds to be caught, nets, and handlines will be in the water less, decreasing the chance of interaction with protected species. The adoption of reduced trip limits for GOM cod and pollock, however, may alter the distribution of fishing effort by common pool vessels, particularly in the Gulf of Maine. Both stocks are caught widely throughout the area, though in recent years GOM cod catches have primarily been taken in inshore areas. The impacts of these changes in effort are difficult to predict. As such, the magnitude and direction of the impact of this proposal compared to the No Action alternative cannot be predicted at this time.

Requiring scallop vessels to land legal-size yellowtail flounder is not likely to have any impacts on protected as compared to the No Action alternative. Given these gear requirements, and the low value of yellowtail flounder relative to the high value of scallops, it is not likely that scallop vessels will modify fishing behavior as a result of this change. This will most likely mean that interaction with protected species will be minimized. The distribution of scallop fishing activity is unlikely to be any different than that under the No Action alternative, also lessening the probability of protected species encounters.

7.3.1.2.2 Option Four – Effort Control Measures Adjustments

This measure authorizes the regional Administrator to make changes to DAS counting or trip limits to either reduce the likelihood an ACL will be exceeded, or to facilitate harvesting an ACL.

Impact to Protected Species
This measure is administrative in nature and is unlikely to have impacts on the protected species. Specific applications of this measure by the Regional Administrator could change the distribution or amount of fishing effort, but any such changes would be designed to achieve Amendment 16 mortality targets and the resulting ACLs. If the Regional Administrator were to implement DAS counting changes or trip limits in the middle of the fishing season, the reduced amount of time and allocation to fish create a derby-like situation, in which fishermen compete to get what quota they can in the small time allotted. The magnitude of this impact, as well as the individual protected species that might be affected will depend on the number of vessels affected by these rules, i.e. those that do not elect to participate in a sector program, and on where, when, and with what type of gear those vessels fish. That number cannot be predicted at this time.

7.3.1.3 Summary of Protected Resources Impacts

The impacts of the Proposed Action to protected species, in comparison with the No Action alternative, are predicted to be neutral overall.

Table 87 – Expected Protected Species Impacts of the Proposed Action Relative to the No Action Alternative

Proposed Measure	Expected Relative Protected Species Impacts	Rationale
Specification of ACLs	0	Administrative measure – has no direct impacts on protected species; very slight positive impacts possible compared with No Action due to smaller catches.
Allocation of yellowtail flounder to the scallop and groundfish fisheries	+/0	Could lead to slightly lower effort from scallop dredges and groundfish fleet in FY 2011 – 2012 than No Action alternative, providing minor potential benefit to protected species.
Specification of US/Canada area TACs	0	No direct adverse effects anticipated compared to No Action, although groundfish fishing effort may experience minor shifts in location as a result of measures designed to keep catches below these TACs.
Trip Limit Modifications	0	Possible that distribution of common pool groundfish fishing effort may shift slightly, but protected species impacts projected to be minimal. Handgear trip limits will have no effect, as gear has little impact on protected species. Yellowtail flounder landing requirement unlikely to change scallop fishing effort, therefore no anticipated effects.
Effort Control Measure Adjustments	0	Administrative measure: effects unknown. Authority would be used in keeping with Amendment 16 mortality targets, so any impacts to protected species should be as described in the amendment.

7.3.2 Impacts on Endangered and Other Protected Species of Alternatives to the Proposed Action

7.3.2.1 ACL Specifications

7.3.2.1.1 Option One – No Action

Under this option, ACLs would not be specified for FY 2010- 2012, a specific allocation of yellowtail flounder would not be made to the scallop and groundfish fisheries, and the U.S./Canada TACs would not be specified for FY 2010.

Impacts to Protected Species
The specification of ACLs is an administrative measure that is usually not expected to have direct impacts on protected species. The ACLs are consistent with the fishing mortality targets adopted by Amendment 16. These targets form the basis for the effort controls that apply to the common pool vessels and the amount of catch that can be taken by vessels that join sectors. As the No Action alternative is defined, the ACLs would be set at the ABC level which would allow for slightly larger catches to be taken by the groundfish fishery. While this would have no impact on the common pool fleet in FY 2010 – because the effort controls do not change as a result of the ACL process – it would allow sector vessels more fishing opportunities, since they are limited by a hard TAC. So indirectly, when compared to the Proposed Action, this option could lead to a very minor increase in fishing effort and thereby increasing the chance that protected species may interact with the fishing fleet. Since the common pool ACL would also be slightly higher, the differential DAS AM might allow slightly more fishing opportunities in FY 2011 if the ACL is exceeded, which may increase the impact to protected species.

The No Action alternative also does not specify a specific allocation of yellowtail flounder for the groundfish and scallop fisheries. The No Action alternative, however, maintains the existing cap on the scallop fishery catches of yellowtail flounder in the CAI, CAII, and NLCA access areas. Without an overall cap on yellowtail flounder catches, scallop fishing activity would not be constrained by yellowtail flounder catches. When compared to the Proposed Action, this could lead to an increase in scallop fishing activity in FY 2011 and FY 2012 in the areas outside the CAI, CAII, and NLCA access areas, since fishing in these areas would still be limited by the cap. The impact may be therefore be slightly stronger and negative on both sea turtles, as they are most likely to interact with scallop dredges, but such an outcome is uncertain and unpredictable at this time.

If U.S./Canada TACs are not specified, there may be changes in the distribution of fishing activity on GB. In recent years the TACs have occasionally restricted access to the Eastern U.S./Canada area; without the TACs, these restrictions would not be implemented and as a result there may be more fishing effort in the eastern area. It is not clear whether catch rates in the eastern area would be higher than in the western area, leading to more fish being caught with less effort. Such an increase in the East may effect the chance of interactions of protected species with the fishing fleet, more specifically species such as harbor porpoise and right whale. The impact of the change in distribution on protected species, however, depends on the gear used and the time and area in which the fishery occurs relative to the presence/absence of protected species, which cannot be predicted with any certainty at this time.

The CAI Hook Gear Haddock SAP TACs would be the same under No Action as in the Proposed Action. This measure is largely administrative in nature and no impacts on protected species are anticipated.

Overall, the indirect impacts of this No Action alternative are expected to be minor, and may be slightly negative, although in all cases there is a high degree of uncertainty around the negative predictions.

7.3.2.1.2 Sub-option One –Yellowtail Flounder Allocations for the Scallop Fishery – Groundfish Committee Recommendation

This option differs slightly from the Proposed Action in that GB and SNE/MA yellowtail flounder allocated to the scallop fishery in FY 2010 is 90 percent of the amount expected to be caught, rather than 100 percent. Because this value does not trigger a specific AM in FY 2010 and is only marginally smaller than that proposed, the protected species impacts of this option would be expected to be indistinguishable from those described for the Proposed Action (see section 6.3.1.1.1).

7.3.2.2 Commercial Fishery Effort Control Modifications

7.3.2.2.1 Option One – No Action

Under this option, the effort control measures that are proposed in Amendment 16 would remain in effect and would not be changed. The impacts on protected species are described in that action. No changes would be expected.

7.3.2.2.2 Option Three – Modification to DAS Counting

This option proposed to adopt differential DAS counting at the rate of 2:1 for an area in the inshore GOM in order to reduce catches of GOM cod and pollock by vessels that do not join sectors.

Impacts to Protected Species
Overall the reductions in DAS reduce groundfish fishing and, by extension, the impact on protected species could be positive, as the chance of interaction with the fishery could decrease. There could be some drawbacks to this option, however. On one hand the effort could shift into other areas as a result of the option, more specifically out of the differential counting areas in the inshore GOM to elsewhere. If the elsewhere is to the offshore GOM then this increase in the rate of effort would potentially result in an increase in the rate of encounter with protected species, particularly for the harbor porpoise, grey and harbor seals which are seasonally abundant in the GOM. On the other hand, the ability of vessels to do this are limited to some extent by the fact that the boats that fish in the inshore GOM tend to be smaller vessels that typically take one or two day trips; their ability to fish in offshore areas is limited. If the vessels stay in the area they are likely to affect the aforementioned species in the same way, although due to the DAS reduction the impact could be less.

A second factor limiting the potential benefits to protected species of this measure is that it only applies to vessels that choose to remain in the common pool; based on September 1, 2009 sector rosters, this is likely to be only a small number of active fishing vessels. Overall, this measure may or may not effect protected species in the inshore GOM area, depending on how fishing behavior changes as a result; such changes at this time are unpredictable. The overall reduction does have the potential to be beneficial to protected species, however.

7.4 Economic Impacts

7.4.1 Economic Impacts of the Proposed Action

7.4.1.1 ACL Specifications

7.4.1.1.1 Option Two – Fishery Specifications and ACLs for FY 2010 – 2012

There are three elements to this option which may have economic impacts. The first is the setting of ACLs, the second is the allocation of yellowtail flounder to the scallop and groundfish fisheries, and the third is the specification of TACs for the U.S./Canada area.

Amendment 16 noted that the economic impacts of the ACL setting process introduce substantial transaction costs into groundfish management. These include the costs of the administrative process for setting and monitoring the ACLs and implementing AMs should the ACLs be exceeded. In addition, the amendment noted that setting an ACL below the ABC imposes opportunity costs on the fishery. With the specification of numeric values for the different allocations, it is possible to develop a rough estimate of the revenues available from groundfish harvests using recent average prices. These estimates can be further divided into the various components of the fishery. While future prices may change, this at least provides a way to evaluate the potential fishery revenues under the ACLs and to compare these revenues to those if catches were at the ABC rather than the ACL and this gives a sense of the opportunity costs of management uncertainty. These analyses should be viewed with caution: it is not clear that the groundfish fishery will be able to harvest all ACLs, as is assumed below. Indeed, recent experience suggests the opposite. Neither of the two original sectors have ever harvested their full allocation of GB cod; the combined common pool and sector vessels have never harvested the available GB haddock or redfish; and catches of many other stocks have been less than the target TACs in recent years. In addition to examining the potential revenues if the entire ACL is harvested, the following attempts to capture the upper and lower bound of potential revenue.

For purposes of analysis estimated potential revenue was limited to the commercial component of ABCs and ACLs that would be allocated to the combined common pool and sectors. With few exceptions these values account for more than 95% of total groundfish revenue. Using average FY 2007 and 2008 prices and assuming the entire commercial ACL is landed, the potential revenues from the proposed ACLs are $198.5 million in FY 2010, increase to $216.5 million in FY 2011, and decline to $206.8 million in FY 2012 (Table 88). These revenues are highly dependent on landings of GB haddock, which account for more than half the total revenues and is the reason why estimated potential revenues decline in 2012 as the contribution of the 2003 year to fishing revenue is diminishing. As discussed in section 3.1.1, the ABCs for GB cod and GB haddock assume no Canadian catch in 2011 and 212, so these estimates are biased high, but are believed to fall within the range expected impacts.

For purposes of comparison the potential revenues associated with the commercial ACL a commercial ABC was computed by netting out recreational, state waters, and other catch components. Assuming 100% of this commercial ABC is landed results in an additional $11 million of groundfish revenue in each year compared to the commercial ACL. This is a rough approximation of the opportunity cost of management uncertainty and provides some guidance on the value of investing in improving catch monitoring.

As noted above it in unlikely that the entire ACL will be harvested particularly for GB haddock due to its large stock size and also because of discarding. It is more realistic to assume GB haddock landings may increase from current levels, but the entire ACL will not be harvested since the ACL is several times larger than any recent landings amount. Approximation of potential revenues is complicated by the fact that vessel owners fishing in sectors formed under Amendment 16 may be expected to have an incentive to fish in a more selective manner than may have been the case in the past. This effect was approximated first by calculating the average underage for each stock during FY 2007-2008 and assuming that any stock where at least 75% of the TTAC for FY 2007 or FY 2008 was taken would be fully landed. For all other stocks the average percentage of the TTAC was assumed to remain unchanged. A second scenario was developed in which the percentage of the TTAC for stocks in the latter category was increased by 50%. For example, GB haddock catch averaged only 17% of the TTAC during FY 2007-2008. In this second scenario the percentage of the TAC landed was assumed to increase to 25.5% of the GB Haddock ACL. Other stocks where the percent of the ACL assumed to be taken was increased include GB cod, CC/GOM yellowtail, witch flounder, American plaice, Acadian redfish, and GOM haddock.

Applying the FY 2007-2008 average underage (i.e. the percent below the TTACs set during FY 2007-2008) to the FY 2010 ACL results in estimated groundfish revenue of $68.4 million, an increase to $75.0 million in 2011 and $76.6 million in 2012. Adjusting these values to account for potential discarding (based on FY 2007-2008 averages), results in a potential reduction in groundfish revenue of approximately $6 million per year to $63 million in 2010, $69.2 million in 2012, and $70.2 million in 2012. With exemptions from trip limits provided to each sector the discard rates experienced during FY 2007 and 2008 may not be realized. Assuming a 50% increase in TAC utilization results in estimated potential groundfish revenues of $87.2 million in FY2010, $96.1 million in 2011, and $97.4 million in 2012. Compared to nominal groundfish revenues during FY 2007 and FY 2008 of close to $85 million this second scenario demonstrates that a change in selectivity or fishing practices could allow sector participants to achieve and even surpass recent levels of groundfish revenues.

Note that 100% of the ABC represents the revenues from the No Action alternative. The Propsoed Action returns lower revnues when compared to No Action.

Table 88 – Potential commercial groundfish revenues ($1,000,000) assuming entire ABC or ACL catch is landed and for different assumed TAC underage and discarding

	100% of ABC	100% of ACL	2007-2008 Average Underage	2007-2008 Underage and Discarding	2007-2008 Underage Reduced by 50%
2010	198.5	189.1	68.4	63.0	87.2
2011	216.5	205.3	75.0	69.2	96.1
2012	206.8	196.0	76.6	70.2	97.4

The proposed CAI Hook Gear Haddock SAP TACs will be established under either the Proposed Action or the No Action alternative because the regulation specifying calculation of the TACs was adopted by an earlier management action. As a result, there is no difference between the No Action alternative and the Proposed Action alternative.

The specification of TACs for the CAI Hook Gear Haddock SAP provides additional opportunities for both common pool and sector vessels using longlines to access GB haddock. The recent three-year average price (CY 2006 – 2008) for GB haddock was $1.31/lb. live weight; using this price the potential ex-vessel revenues from this SAP are $12.2 million in FY 2010 and decline to $7.4 million in FY 2012. In recent years only a fraction of the available TAC has been caught, however, so the potential revenues may not be realized. Catches have remained relatively constant at roughly 400,000 lbs. (181 mt) or less since 2005. Even after the SAP season and area were expanded in 2009 catches did not increase significantly.

7.4.1.1.1.1 Proposed Action – Yellowtail Flounder Allocation to Scallop Fishery

The allocation of yellowtail flounder between the scallop and groundfish fisheries may affect the fishing opportunities of the respective fleets. Determining the exact impact of the allocations is difficult because of the different management measures between the two fisheries. In particular, the AMs that apply to the fisheries shape the extent of the impacts. The Proposed Action bases the allocation to the scallop fleet of GB and SNE/MA yellowtail flounder on an estimate of the amount the fishery is expected to catch if it harvests its entire scallop yield. In FY 2010, the scallop fishery is assumed to harvest 100 percent of this estimated amount. In FY 2011 and FY 2012 the fishery is allocated 90 percent of this amount. No specific allocation is made for CC/GOM yellowtail flounder as the estimated scallop fishery catches are small enough to be included as part of the “other sub-component” allowance.

Elements of the groundfish fishery actively target yellowtail flounder, particularly in the GB stock area. The species is also caught while fishing for other stocks, particularly other flatfish. Under sector provisions, sector vessels can only fish in a stock area with gear that catches yellowtail flounder if they have Annual Catch Entitlement (ACE) remaining. Since sectors are subject to hard TACs, reducing the amount of yellowtail flounder available to the sectors may limit their opportunities to fish for other species. For vessels in the common pool the issue is more complex. Because common pool vessels are governed by effort controls and a differential DAS AM in FY 2010 and FY 2011, a reduction in yellowtail flounder available to this component does not necessarily result in an immediate loss of opportunities; but exceeding an ACL in the first year triggers the AM in the second year, so ultimately fishing opportunities are affected. In the U.S./Canada area the impacts are more immediate since the catch of GB yellowtail flounder is controlled by a hard TAC and by in-season AMs such as changes in trip limits, gear requirements, and the loss of access to the Eastern U.S./Canada area. Beginning in FY 2012 with the adoption of the hard TAC AM for common pool vessels, any change in yellowtail flounder allocations has immediate impacts on the common pool fleet.

For the scallop fishery, yellowtail flounder is an important incidental catch species. Since 2004, scallop fishery catches of yellowtail flounder have not showed clear trends even while yellowtail stocks rebuild (Table 89). As a portion of the total catch, their percentage has increased as the restrictions on the groundfish fleet reduced overall harvest. To date, the only limits on yellowtail flounder catch applicable to this fishery have been on the amount that can be harvested from within the CAI, CAII, and NLCA closed area access programs. Regulatory requirements establish this limit as 10 percent of the target TAC/ACL for the GB or SNE/MA stocks. The scallop management measures, however, compensate scallop vessel with trips in open areas if an access area is closed due to yellowtail flounder catches. With the adoption of an allocation and AMs applicable to the scallop fishery the possibility exists that the amount of yellowtail flounder available to this fishery could limit access to scallops in all areas. In FY 2010, this allocation is treated as an “other sub-component” of the yellowtail flounder ACL and there are no scallop fishery AMs should it be exceeded. In FY 2011 and beyond, there will be AMs for the scallop fishery. The exact nature of those AMs is still under development and it is not clear how they will impact scallop vessels.

The relative value of yellowtail flounder to the two fisheries was calculated, but the characterization of this value as a loss or gain to either fishery is complicated by the different management measures just described. For the scallop fishery, future discard rates were calculated based on past observed discard rates in open and access areas and future changes in yellowtail flounder and scallop biomass. These rates were applied to the expected scallop yield under four different scallop management scenarios to estimate the yellowtail flounder the fishery would be expected to harvest absent other limits. This "expected" or "needed" yellowtail flounder was then reduced by ten percent in FY 2011 and FY 2012 as proposed by this action. The entire reduction was assumed to be taken from open areas, and open area catch was reduced accordingly. The differences in revenues were then calculated between the expected yellowtail flounder catch and the reduced yellowtail flounder catch. While initially the calculations were done for four different scallop management scenarios, the Council selected a specific scenario prior to making this yellowtail flounder decision and only the results for that scenario are shown below.

The results of these calculations are shown in Table 100 through Table 104. Each metric ton of yellowtail flounder is more valuable to the scallop fishery in areas with lower discard rates because more scallops are landed for each metric ton allocated. Because of higher discard rates on GB – particularly in the CAII access area – the lowest values of yellowtail flounder are in this area. Overall, allocating 90 percent of the expected yellowtail flounder catch in GB and SNE/MA may reduce scallop vessels revenues by $35 to $36 million for FY 2011 – FY 2012 when compared to No Action (where revenues are not limited by an overall yellowtail flounder cap). This ranges from 6% to 7% of forecast scallop revenues. In FY 2010 there aren't expected to be any revenue changes realized by the scallop fishery since there is no specific allocation and no specific measures that limit overall scallop fishing if the yellowtail flounder allocation is exceeded. The Council may consider a measure in Scallop Amendment 15 that adjusts FY 2011 or FY 2012 allocations if the scallop fishery exceeds the amount estimated for FY 2010, but that measure has not yet been designed.

A similar analysis was performed for the groundfish fishery for the GB and SNE/MA yellowtail flounder stocks. In both stocks areas two calculations were developed. The first is a straightforward estimate of the value of each metric ton of yellowtail flounder based on 2007 and 2008 data. The second calculation determined the total value of all species landed on groundfish trips in the area, and then determined the value of this total per metric ton of yellowtail flounder landed. This high value is most appropriate for those vessels in sectors, or for FY 2012 when the hard TAC AM affects common pool vessels, since it shows the loss of all revenue if yellowtail flounder leads to a complete loss of access to a stock area. On Georges Bank this was further refined for common pool vessels by taking into account discard rates and the different management measures in the Eastern and Western U.S./Canada areas. Since the Eastern Area closes if the yellowtail flounder TAC is exceeded, all revenues were sacrificed from this area, while fishing continues in the Western Area. This provides a third, or expected, value per metric ton. In the SNE/MA area, only trips that landed yellowtail flounder were considered in the analysis. These values were multiplied by the allocations under consideration to determine the revenue reductions for the groundfish fishery under the proposed allocation and the three scallop management scenarios under consideration.

Results are summarized in Table 105and Table 106. The value of each metric ton of yellowtail flounder to the groundfish fishery ranges from a low of $3,296 to a high of $41,176. GB yellowtail flounder is more valuable than SNE/MA yellowtail flounder because of the increased groundfish fishing opportunities on GB. The total losses to the fishery range from a low of $326,000 to a high of $13 million over the next three years. To put these values in context, FY

2005 to FY 2007 groundfish revenues averaged $101 million and total revenues on groundfish trips averaged $158 million (see NEFMC 2009), but Amendment 16 may reduce groundfish revenues by 15% and total revenues by 18%. The changes estimated here thus fall in the range of less than one percent to 15.3% of groundfish revenues, and less than one percent to 10% of total revenues on groundfish trips.

All of these estimates assume no changes in fishing behavior by either fishery. In both cases changes in fishing practices could mitigate potential revenue losses. For example, if the ratio of yellowtail flounder caught to scallops landed can be decreased through either gear modifications or fishing practices, then the scallop fishery will harvest more of its available yield prior to triggering any AMs that may be adopted for FY 2011 and beyond. If the groundfish fishery can do the same – reducing the yellowtail flounder caught while fishing for other species – the same result can be expected and revenue losses would not be as large as estimated here. There is evidence in observed groundfish fishing trips that this may be possible, at least for roundfish species.

Compared to the No Action alternative, this measure is likely to reduce scallop fishery revenues. Under No Action, no specific allocation is made to the scallop fishery and thus the scallop yield should approach that estimated for the adopted scallop management scenario. For the groundfish fishery the differences between this option and No Action are less certain. If an allocation is not made to the scallop fishery, then the overall yellowtail ACL would serve as the trigger for groundfish AMs. Since the scallop fishery presumably would still catch yellowtail flounder without any limit, it is possible that excessive yellowtail flounder catches would result in groundfish AMs and lost fishing opportunities for this fleet.

Table 89 – Scallop fishery yellowtail flounder catches, CY 2004-2008

	Fishing Year	2004	2005	2006	2007	2008
CC/GOM	Total TAC	881	1233	650	1078	1406
	Total TAC for scallop fishery*	86.3	120.8	63.7	105.6	137.8
	Scallop AA open or closed	N/A	N/A	N/A	N/A	N/A
	Total YT catch by dredge gear (landings and discards)	18	6	12	35	5
	Total YT Catch (all gear)	1186	997	620	627	727
	Scallop catch as percent of total catch	1.5%	0.6%	1.9%	5.6%	0.7%
SNE	Total TAC	707	1982	146	213	312
	Total TAC for scallop fishery*	69	194	14	21	31
	Scallop AA open or closed	open	closed	open	open	open
	Total YT catch by dredge gear (landings and discards)	125	130	168	188	151
	Total YT Catch (all gear)	614	367	369	396	504
	Scallop catch as percent of total catch	20.3%	35.4%	45.5%	47.5%	29.9%
GB	Total TAC	6000	4260	2070	900	1869
	Total TAC for scallop fishery*	588	417	203	88	183
	Scallop AA open or closed	open	open	open	open	closed
	Total YT catch by dredge gear (landings and discards)	84	194	254	122	134
	Total YT Catch (all gear, U.S. only)	6386	3637	1573	1564	1118
	Scallop catch as percent of total catch	1.3%	5.3%	16.1%	7.8%	12.0%

Table 90 – Summary of YT needed by scallop fishery in 2010-2012 in MT and % of total YT ABC

		total YT needed (mt)			% YT needed		
No Closure - F=0.20		**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
	CC	30	26	32	3.40%	2.40%	2.80%
	GB	110	226	353	9.2%	20.9%	28.8%
	SNE	111	96	151	22.5%	14.0%	15.0%

Table 91 – Yellowtail flounder allocated to the scallop fishery under the Proposed Action. Not reduced for management uncertainty. Note the action does not make a specific allocation for CC/GOM yellowtail flounder.

	YTF Allocated, By Stock Area and Scallop Management Scenario		
	CC	GB	SNEMA
NC, F=0.2			
2010	*30*	110	111
2011	*23.4*	203.4	85.5
2012	*28.8*	317.7	135

Table 92 – Change in scallop fishery revenues per mt of yellowtail flounder allocated, by year, YTF stock area and scallop management scenarios. Assumes allocation is 90 percent of expected harvest.

Year/ Scenario	**Change in Revenue/mt YTF, Dollars**			**Change as Percent of Revenues from YTF Stock Area**		
	CC	GB	SNE/MA	CC	GB	SNEMA
NC, F=0.2						
2010						
2011	$3,500,027	$116,969	$3,544,078	3.8%	0.2%	1.3%
2012	$3,809,121	$271,570	$1,778,705	3.1%	0.3%	0.7%

Table 93 – Change in scallop revenues if YTF allocation is 90 percent of amount expected to be harvested for GB and SNE/MA stocks, and no specific allocation for CC/GOM YTF stock

Scallop	**Year**		
Scenario	2010	2011	2012
NCF=.2		$35,030,399	$36,266,973
	As Percent of Total Scallop Revenues		
NCF=.2		7%	6%

Table 94 – Change in revenues on groundfish trips per mt of YTF; average of 2007 and 2008. For GB, expected revenues consider difference in management measures for common pool vessels between EGB and WGB.

	GB	SNE/MA
YTF Revenues/mt	$3,296	$3,895
Total Revenues/mt	$41,176	$28,708
Expected Revenues/mt	$12,674	

Table 95 – Reduction in groundfish revenues if scallop fishery is allocated 90 percent of expected harvest of YTF for GB and SNE/MA YTF stock areas. These values represent the difference between potential groundfish revenues if there is no scallop fishery catch of yellowtail flounder and the proposed allocation. Based on 2007/2008 revenues.

	Georges Bank			SNE/MA	
	Low	**High**	**Expected**	**Low**	**High**
NC, F=0.2					
2010	$326,304	$4,076,424	$1,254,726	$389,111	$2,867,929
2011	$670,406	$8,375,198	$2,577,892	$333,023	$2,454,534
2012	$1,047,139	$13,081,615	$4,026,530	$525,825	$3,875,580

7.4.1.1.1.2 Sub-option 2 – U.S./Canada Resource Sharing Understanding TACs

The economic impacts that result from the use of hard TACs for the shared stocks of GB stocks can best be described in terms of five different effects: 1) Hard TACs for cod, haddock, and yellowtail flounder will limit the total amount of catch of these stocks (landings and discards) allowed by law; 2) Associated rules such as gear restrictions, trip limits, and closures that may be implemented in order to prevent catch from exceeding the TACs will impact when and how such access to these stocks occurs; 3) Access restrictions implemented to control catch of one particular stock may indirectly impact access to other stocks; 4) Discarded fish count against the TAC; and 5) The timing and rate of landing of these stocks may impact the market for these species. These effects are described in more detail in the following section. This discussion builds upon the information contained in the affected environment, the description of the GB groundfish fishery.

The economic impacts of the proposed hard TACs are difficult to predict because of the 5 effects noted above, the fact that FY 2010 will include many new regulations and new sectors, and the fact that these effects interact in a complex manner. The amount of fish landed and sold will not be equal to the sum of the TACs, but will be reduced as a result of discards, and may be further reduced by limitations on access to stocks that may result from the associated rules. Reductions to the value of the fish may result from fishing derby behavior and potential impact on markets.

The cod and yellowtail TACs specified under the Understanding represent reductions to the size of the TACs compared to those specified for FY 2009 as shown in Table 96 below.

Table 96 – TACs for U.S./Canada stocks in FY 2009 and 2010

Stock	2009 TAC (mt)	2010 TAC (mt)	Difference
GB yellowtail	1,617	1,106	- 32 %
Eastern GB cod	527	338	- 36 %
Eastern GB haddock	11,100	11,988	+ 7 %

A further reduction to the TAC will result from the allocation of GB yellowtail flounder to the scallop fishery. Although the allocation to the scallop fleet is larger than in the past, the amount of yellowtail caught by the scallop fleet is not likely to increase substantially over historical levels.

As noted above, it is difficult to predict the fishing patterns that are likely to occur in FY 2010 due to the many regulatory changes anticipated. Although there may be increased efficiencies as a result of sectors, as well as decreased discarding, which may increase revenue and/or profitability, the substantially reduced TACs will never-the-less result in reduced overall revenue. The reduced revenue will be due to both the decreased potential landings of cod and yellowtail, as well as a loss of revenue from other stocks caught on trips to the Eastern Area, when vessels lose access to this area when the TAC is projected to be caught. If the new management measures result in vessels being able to harvest more haddock, some of the decreased revenue described above may be recouped through increases in haddock landings.

Providing an estimate of possible catch levels and the associated revenue, based upon multiple assumptions, may be the most useful way of estimating economic impacts. Table 97 contains estimates of 2008 revenue from the U.S./Canada Area, based upon ‘matched’ dealer data, and extrapolations based on total trip length to trip length on matched trips.

Table 97 – Revenue from U.S./Canada Area for Fishing Year 2008

Eastern Georges Bank Cod	$ 1,610,820
Eastern Georges Bank Haddock	$ 3,797,560
Georges Bank Yellowtail Flounder	$ 3,205,300
All Species (including other groundfish and non-groundfish species)	$ 41,819,778

Table 98 provides an estimate of revenue associated with the proposed 2010 TACs, based upon the range of historical U.S./Canada Area catches, 2008 discard to catch ratios, and 2008 prices. Average price estimates are based on dealer reports submitted to the NMFS Fisheries Statistics Office. Catch and landings data are based upon VMS and dealer report data, and adjusted according to the methods described by Caless, Wilhelm and Wang, 2005. The estimate of the percentage of the TAC caught is based upon historic catch rates. It is likely that cod will be the most limiting stock.

Table 98 – Revenue Estimates from Landings of Shared Stocks from U.S./Canada Management Area for 2010

Stock	TAC	% of TAC Caught	Price/lb	Revenue
Eastern GB Cod	338	90 %	$ 1.71	$ 974,757
Eastern GB Haddock	1,106	13 %	$ 1.09	$ 3,595,090
GB Yellowtail	11,988	93 %	$ 1.33	$ 2,171,422

* Discard rates: 15 %, 4 %, and 28 % (cod, haddock, and yellowtail, respectively)

According to Table 97 and Table 98 above, for 2008 the total revenue from Eastern GB cod, Eastern GB haddock, and GB yellowtail was approximately $ 8,613,680. For 2010, the estimate of the total revenue from Eastern GB cod, Eastern GB haddock, and GB yellowtail is $ 6,741,269, a 22 % reduction from 2008.

When considering the revenue associated with the landings of cod, haddock, and yellowtail flounder from the U.S./Canada Area, and the impact of interannual fluctuations in the size of the

TACs, it is important to note that many other species are landed from trips to the U.S./Canada Area. If the time period during which vessels have access to the area is prolonged, there would also be increased landings of other groundfish and non-groundfish species, resulting in additional revenue. Due to the implications of catching a TAC for either the common pool or sector vessels on access to resources in addition to cod, haddock and yellowtail flounder, the reduced size of the 2010 cod and yellowtail TACs will affect total revenue in 2010. However, it is very difficult to estimate the potential revenue for *other stocks* caught on trips to the U.S./Canada Area for FY 2010 due to the fact that the number of vessels fishing in the common pool and in sectors is not finalized, and the regulations in FY 2010 will be significantly different from 2008. The U.S./Canada TACs will be divided between the common pool and sectors. When the common pool cod, haddock, or yellowtail flounder TAC is projected to be caught, common pool vessels may no longer fish in the Eastern U.S. Canada Area, and lose all fishing opportunity in the Eastern Area. If the yellowtail flounder TAC is caught, a common pool vessel may still fish in the Western U.S./Canada Area, but may not retain yellowtail flounder. When a particular sector catches its TAC of Eastern U.S. cod or haddock the implications are the same (as for a common pool vessel), however when a sector catches its TAC (ACE) for GB yellowtail flounder they lose fishing opportunity throughout the yellowtail stock area.

The estimated total revenue from 2007 was $ 34,906,263 and there were 1,272 trips total, and 138 trips to the Eastern Area ($ 27,442/trip based on total trips). During 2008, there were 1,273 trips, and 714 trips to the Eastern Area ($ 32,851/trip based on total trips). Given the percentage reductions in the TAC proposed for GB yellowtail and Eastern GB cod, and the fact that both these TACs, when reached may curtail access to the U.S./Canada Area, it is possible that total revenue may be reduced by up to 30 percent from 2009 revenues. The U.S./Canada TACs in 2009 were slightly lower than the TACs in 2008. It also should be noted that the amount of haddock that has been harvested from the U.S./Canada Area has been increasing, but it is unknown whether this trend will continue.

In contrast with the No Action Alternative, the Proposed Action would have short term negative economic impacts, due to the fact that the harvest of the shared stocks would be constrained by the TACs. The long term impacts of the No Action Alternative are more likely to be negative than the proposed Alternative, due to the increase biological risk associated with the No Action Alternative. Stock rebuilding and the associated revenue that is likely to result from an increasing stock size could be jeopardized by the No Action Alternative.

7.4.1.2 Commercial Fishery Effort Control Modifications

7.4.1.2.1 Option Two – Modification of Trip Limits

The economic impact of the proposed measures was evaluated by imposing the trip limits to observed activity for vessels that were in the common pool and had at least one Category A DAS as of September 1, 2009. Vessel trip reports submitted for trips taken during FY 2007 were used as a measure of activity. Monthly average prices calculated from dealer data were used to calculate revenues for each trip. Summing the value of observed trips taken by the common pool vessels provides a baseline against which the fishing regulations that will prevail under Amendment 16 as modified by FW44 can be compared.

To approximate FY 2010 fishing regulations the FY 2007 data were adjusted to account for the fact that possession of windowpane flounder, SNE winter flounder, Atlantic wolfish, and ocean pout would be prohibited. Days absent for each trip were calculated as the elapsed time between the sailing and landing date reported in the VTR. Days absent were then adjusted to reflect the 24-hour clock that would be implemented under Amendment 16. Trips that occurred that landed pollock were adjusted to reflect the proposed pollock trip limit under consideration for this FW44. No adjustment for GOM cod was required since the proposed action would retain the GOM cod trip limit at FY07 levels. Taking all of these adjustments into account the Amendment 16 conditions as modified by the proposed action, the trips taken during FY2007 were filtered to eliminate trips that landed groundfish that would have exceeded the A DAS allocations for each permit holder. These trips were filtered by ordering each groundfish trip from highest gross stock to lowest. Any trip for which the running total of calculated days absent exceeded the allocated A DAS for FY2010 was deleted.

The analytical approach provides a basis of comparison between the effort control program as proposed under Amendment 16 (No Action) and the proposed modifications under FW 44. The approach is limited in that adjustments to fishing locations or strategies are not considered. Additionally, the possibility for leasing DAS to offset the impacts of either the simulated Amendment 16 /FW 44 scenario was not considered. For this reason, the estimated impacts may reflect an upper bound condition in terms of adverse impacts.

As of September 1, 2009 there were 279 permits with an A DAS allocation that had enrolled in the common pool. Of these permits 79 did not record any activity through a VTR during FY 2007. These permits were eliminated from further consideration. An additional 78 permits did not report any trip where groundfish were landed and 9 vessels were found to be unaffected by the A16/FW 44 measures. These 87 vessels were also eliminated from further consideration. This left 113 vessels that were retained for further analysis. Total estimated fishing revenue for these vessels during FY 2007 was $24.8 million of which $7.2 million (29%) came from trips where groundfish were landed. Note that total value of groundfish landed was $4.2 million which represents 58% of the value of all species landed on groundfish trips, and 17% of total FY 2007 revenue.

After adjusting FY 2007 data for the A16/FW 44 measures estimated total revenue fell $5.1 million to $19.7 million; a reduction of 20.6% in total revenue and a 69% reduction in groundfish trip revenue. The majority of these impacts would be associated with the DAS reduction and 24-hour clock as revenues from any of the species with zero possession limits was low with the exception of SNE/MA winter flounder. Further, the total impact of the pollock possession limit was also low as only 36 of the common pool vessels reported landing any pollock during FY2007, and only 8 landed pollock in excess of the proposed trip limit on at least one occasion. Nevertheless for some of these 8 vessels pollock was an important source of total revenue.

The economic impacts of the A16/FW44 measures may be partially mitigated by DAS leasing. Using estimated days absent as a proxy for DAS the 113 common pool vessels used 1,944 DAS during FY2007. Conversion of these DAS into 24-hour clock increments amounts to 3,769 DAS which would be the number of 24-hour DAS required to replicate FY2007 fishing activity. With an estimated 1,291 DAS associated with A16/FW44 conditions groundfish activity an additional 2,478 DAS would be required to fish at FY2007 levels, but only about 3,600 category A DAS will be allocated to the common poll based on September 1 rosters. Note that these DAS allocations do not count carry-over DAS which would increase DAS that may be available for leasing. Even if there were sufficient leasable DAS were available restrictions on trading within vessel baseline characteristics may make it difficult to move DAS where they are needed.

Whether the current roster of vessels enrolled in the common pool is representative of the vessels that may end up in the common pool on May 1, 2010 is uncertain. For the most part, the current roster appears to be comprised of vessels that are primarily engaged in fisheries other than groundfish. During FY2007 of the 200 vessels that showed any activity only 50 took any more than 1/3 of total trips in the GOM. These 50 vessels took 3,458 trips of which 3,200 were to a GOM statistical area. However, the majority of these GOM trips (2,428) did not land any groundfish, skates, or monkfish leaving a total of 772 trips where groundfish was landed. Note that cod was landed on every trip taken to the GOM that landed groundfish. However, the 800 pound trip limit was constraining on only 188 occasions. Pollock was landed on less than half (304) of the 772 GOM groundfish trips, but with the exception of 46 occasions, landings of pollock were below the proposed 1,000 pound per day trip limit.

Impacts on Sector Membership

As of September 1, 2009, permits committed to sectors accounted for over 90 percent of the PSC for most stocks. Permit holders must make a decision whether to remain in a sector or to choose to fish under the common-pool effort controls by May 1, 2010. Permit holders can be expected to make this decision based at least in part on whether they think they will be more profitable in a sector or in the common-pool. An element of this evaluation is the amount of fish they can land under either set of rules. This is a complicated decision that is difficult to model given 20 groundfish stocks and because of the possibility that fishing behavior may change. If the decision is based solely on GOM cod landings, the effect on probable sector membership of the proposed differential DAS counting measure and the proposed GOM cod trip limit can be evaluated. Table 107 shows the probable sector membership if the decision is based solely on the potential GOM cod landings under the effort control measures proposed as compared to the sector PSCs. This comparison assumes that every DAS is used on the GOM and the trip limit is caught on every DAS. Note that even with fewer vessels in sector than in the common pool, under all three scenarios modeled the sector total PSC is higher than the common pool total PSC. The proposed measures have more impact on those vessels with a high history of GOM cod landings and those vessels can catch more GOM cod in sectors than in the common pool. Conversely, the permits that remain in the common pool are those that do not have recent history (FY 1996 – FY 2006) of landing large amounts of GOM cod. As noted above, many of these permits fish in other areas.

Under the No Action alternative, only 33 permits with DAS receive an allocation of GOM cod that is larger than the amount of GOM cod they can land under the Amendment 16 effort controls. This is about 20 percent of the permits that receive a larger GOM cod allocation under the Proposed Action. This measure is expected to increase the number of permits that are likely to join sectors when compared tio No Action.

Table 99 – Probable sector membership if decision is based solely on potential GOM cod landings

	800 lb./DAS
Vessels in Common Pool w/DAS	812
Vessels in Sectors w/DAS	162
GOM Cod Common Pool PSC	37%
GOM Cod Sector PSC	63%

7.4.1.2.2 Option 4 – Effort Control Measure Adjustments

Impacts on Common Pool Vessels

This option authorizes the regional Administrator to change trip limits or DAS counting in order to either facilitate harvesting the ACL of a stock or to reduce the likelihood of exceeding the ACL for a stock. This provision complicates the decision that permit holders make while choosing to join a sector or to remain in the common pool. Any business plan evaluating the potential profitability of the common pool must consider that the trip limits or DAS counting may change over the course of the year and alter the possible revenues the permit can earn. There are no bounds on the changes that may be made, and similar authority in the past led to a 33 pound trip limit for GOM cod. Any estimates of common pool revenue will have much more uncertainty due to the possibility of regulatory changes that make the planning invalid. This may sway some permit holders to prefer the relative certainty of the sector allocations over the common pool when compared to No Action.

Another possible impact of this provision is that it may skew the DAS leasing and transfer markets when compared to the same market under the No Action alternative. Prices paid before a change in either a trip limit or differential DAS adjustment may not reflect the earnings potential of those DAS should a change be implemented. Buyers and sellers may choose to negotiate a price that is dependent on the regulations in effect when the DAS are used; this would seem to shift part of the risk to the seller of the DAS since most fishermen expect regulations to become more stringent over time.

Finally, this measure may encourage fishermen to alter fishing practices to fish under known conditions rather than risk a devaluing of their effort should trip limits be reduced or DAS counting rates be increased. When compared to No Action, this could create a derby that leads actually precipitates such changes. It may also depress prices and interrupt the flow of product to markets should all vessels choose to fish early in the year before any such changes can be announced. To some extent the existence of sectors may help mitigate these effects on markets if sector vessels avoid fishing at the same time.

7.4.2 Economic Impacts of Alternatives to the Proposed Action

7.4.2.1 ACL Specifications

7.4.2.1.1 Option One – No Action

As described in section 4.1.1, the No Action alternative assumes that because of statutory requirements NMFS would choose to establish an ACL system should the Council not do so. The assumption is that NMFS would adopt ACLs that were equal to the ABC set by the Council's SSC, but would not make allocation decisions considered the purview of the Council. As a result, under the No Action alternative there would not be a specific yellowtail flounder allocation to the scallop and groundfish fisheries. The No Action alternative also assumes that the U.S/Canada Resource Sharing Understanding TACs would not be adopted.

As noted in the discussion of the economic impacts of the Proposed Action (section 6.4.1.1.1), it is possible to develop a rough estimate of the revenues available from groundfish harvests using recent average prices. These analyses should be viewed with caution: it is not clear that the groundfish fishery will be able to harvest all ABCs/ACLs, as is assumed below. Indeed, recent experience suggests the opposite.

Using average of 2007 and 2008 prices and assuming the entire ABC is landed, the potential revenues from the proposed ABCs are $198.5 million in FY 2010, increase to $216.5 million in FY 2011, and decline to $206.8 million in FY 2012 (Table 88). These revenues are highly dependent on landings of GB haddock, which account for more than half the total revenues

Because under No Action the ABC is higher than the ACL set by the Proposed Action, potential groundfish fishery revenues are also higher. The No Action alternative, however, may not fully meet M-S Act requirements to establish ACLs. Any NMFS action to implement these requirements would initially be a short-duration emergency or interim action and would not permanently adopt ACLs for this fishery.

Unlike the Proposed Action, the No Action alternative would not allocate yellowtail flounder to the scallop and groundfish fisheries. In the short term this could lead to larger ex-vessel revenues in both fisheries. With respect to the scallop fishery, absent a specific allocation of yellowtail flounder it is not clear how the scallop fishery could be limited by its yellowtail flounder catch even though Amendment 16 anticipates that by FY 2011 AMs will be in place to do so. The only existing regulation that would remain in effect is one that limits catches of yellowtail flounder within CAI, CAII, or the NLCA to 10 percent of the GB or SNE/MA yellowtail flounder TAC/ACL. While this provision has limited access to these areas in the past, and may in the future, it does not restrict overall scallop fishing activity outside the areas. Scallop management programs attempt to compensate permit holders with additional DAS in open areas if they lose trips in the scallop access areas. These trips may be less profitable because of lower catch rates, but these trips would not be affected by yellowtail flounder catches if an allocation is not made.

As a result of not making a yellowtail flounder allocation, scallop fishing revenues in FY 2011 and FY 2012 would likely be higher than anticipated under the Proposed Action. As shown in section 6.4.2.1.2, in FY 2011 and FY 2012 the limit on yellowtail flounder catch may reduce scallop fishery revenues by $35 million and $36 million, respectively. If an allocation is not made then the scallop catches would not be constrained by yellowtail flounder. The effects of the No Action alternative do not differ from the Proposed Action in FY 2010. Under the Proposed Action, the amount allocated to the scallop fishery is the amount the fishery is expected to catch while harvesting the total available scallop yield; it is not expected to constrain the scallop catch.

The No Action alternative would not establish U.S./Canada TACs that are recommended by the TMGC under the terms of the U.S./Canada Resource Sharing Understanding. As discussed in section 6.4.1.1.1.2 the economic effects of the TACs are difficult to predict because in FY 2010 many new regulations and additional sectors will be implemented. In A qualitative sense, not setting the U.S./Canada TACs removes a layer of regulatory restrictions from the groundfish fishery. When TACs are specified for the EGB cod and haddock stocks (as is the case with the Proposed Action), the amount of these two species that can be harvested from the Eastern U.S./Canada area is constrained. This has not been an issue for EGB haddock because the TACs are larger than recent catches. But the small allocations of EGB cod have limited fishing opportunities in this area. For example, in July 2005 the number of trips a vessel could take into the area was reduced to one per month and vessels were required to use a separator trawl, and in

August 2005 the area was closed. All of these measures were implemented to prevent the EGB cod TAC form being exceeded. If a TAC is not specified, it is possible that more haddock will be taken from the Eastern U.S./Canada area, increasing revenues from this stock. It is also possible that other species will be successfully harvested from this area without the EGB cod limit.

There may be similar effects from not specifying a GB yellowtail flounder TAC. NMFS has modified access to the area in order to reduce the likelihood that this TAC will be exceeded. Without a TAC specified these measures cannot be triggered. This may allow for increased catches of all groundfish stocks as well as monkfish and skates from GB.

In the short term, not specifying the U.S./Canada TACs could lead to increased revenues for U.S. fishermen. As noted in section 6.1.1.1.1.2, however, not specifying TACs may increase the risks of overfishing these stocks and lead to long-term declines in landings and revenues.

The CAI Hook Gear Haddock SAPs would be the same under the No Action and Proposed Action. The economic impacts of No Action would not differ from the Proposed Action; they are described in section 6.4.1.1.1.

7.4.2.1.2 Sub-option 1 – Yellowtail Flounder Allocation to Scallop Fishery

The allocation of yellowtail flounder between the scallop and groundfish fisheries may affect the fishing opportunities of the respective fleets. Determining the exact impact of the allocations is difficult because of the different management measures between the two fisheries. In particular, the AMs that apply to the fisheries shape the extent of the impacts. The approach for analyzing the impacts of the alternatives not selected was identical to that described in the economic impacts of the Proposed Action (see section 6.4.1.1.1.1 for details). The general discussion in that section is applicable to this alternative as well.

The relative value of yellowtail flounder to the two fisheries was calculated, but the characterization of this value as a loss or gain to either fishery is complicated by the different management measures just described. The results of these calculations are shown in Table 100 through Table 104. Each metric ton of yellowtail flounder is more valuable to the scallop fishery in areas with lower discard rates because more scallops are landed for each metric ton allocated. Because of higher discard rates on GB – particularly in the CAII access area – the lowest values of yellowtail flounder are in this area. Overall, allocating 90 percent of the expected yellowtail flounder catch in GB and SNE/MA may reduce scallop vessels revenues by $29 to $37 million, depending on the scallop management scenario selected for FY 2010 – FY 2012. This ranges from 7% to 12% of forecast scallop revenues. As previously explained, in FY 2010 these revenue changes are unlikely to be realized by the scallop fishery since there are no specific measures that limit overall scallop fishing if the yellowtail flounder allocation is exceeded.

Table 100 – Summary of YT needed by scallop fishery in 2010-2012 in MT and % of total YT ABC

		total YT needed (mt)			% YT needed		
No Closure - F=0.20		**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
	CC	30	26	32	3.40%	2.40%	2.80%
	GB	110	226	353	**9.2%**	**20.9%**	**28.8%**
	SNE	111	96	151	22.5%	14.0%	15.0%
No Closure - F=0.24		**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
	CC	39	26	32	4.5%	2.5%	2.8%
	GB	146	230	320	**12.2%**	**21.2%**	**28.7%**
	SNE	135	98	151	27.3%	14.3%	15.1%
Closure F=0.18		**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
	CC	17	13	10	2.0%	1.3%	0.9%
	GB	182	256	320	**15.2%**	**23.7%**	**26.1%**
	SNE	179	130	151	36.3%	19.0%	15.1%

Table 101 – Yellowtail flounder allocated to the scallop fishery under the Groundfish Committee recommendation (90 percent of amount expected to be harvested). Not reduced for management uncertainty. Note the Committee did not recommend a specific allocation for CC/GOM yellowtail flounder.

	YTF Allocated, By Stock Area and Scallop Management Scenario		
	CC	GB	SNEMA
NC, F=0.2			
2010	*27*	99	99.9
2011	*23.4*	203.4	85.5
2012	*28.8*	317.7	135
NC, F=.24			
2010	*35.1*	131.4	121.5
2011	*23.4*	207	88.2
2012	*28.8*	316.8	135.9
CL, F=0.18			
2010	*15.3*	163.8	161.1
2011	*11.7*	230.4	117
2012	*9*	288	135.9

Table 102 – Change in scallop fishery revenues per mt of yellowtail flounder allocated, by year, YTF stock area and scallop management scenarios. Assumes allocation is 90 percent of expected harvest.

Year/ Scenario	Change in Revenue/mt YTF, Dollars			Change as Percent of Revenues from YTF Stock Area		
	CC	GB	SNE/MA	CC	GB	SNEMA
NC, F=0.2						
2010	$1,721,301	$157,963	$2,469,361	3.3%	0.9%	1.1%
2011	$3,500,027	$116,969	$3,544,078	3.8%	0.2%	1.3%
2012	$3,809,121	$271,570	$1,778,705	3.1%	0.3%	0.7%
NC, F=.24						
2010	$1,702,671	$157,540	$2,051,633	2.6%	0.7%	0.8%
2011	$3,317,598	$109,586	$3,297,153	3.8%	0.2%	1.2%
2012	$3,535,475	$252,150	$1,727,238	3.1%	0.3%	0.7%
CL, F=0.18						
2010	$2,116,906	$185,627	$1,883,399	5.9%	0.5%	0.6%
2011	$3,875,276	$100,106	$2,405,464	7.7%	0.2%	0.8%
2012	$4,641,334	$241,138	$1,952,471	10.0%	0.3%	0.7%

Table 103 – Change in scallop revenues if YTF allocation is 90 percent of amount expected to be harvested for all stocks

	Year		
Scenario	2010	2011	2012
NCF=.2	$34,311,399	$45,412,307	$48,456,161
NCF=.24	$36,596,510	$43,656,154	$46,356,842
CF=.18	$40,652,329	$39,015,938	$41,918,146
	As Percent of Total Scallop Revenues		
NCF=.2	11%	9%	9%
NCF=.24	10%	9%	8%
CF=.18	13%	8%	7%

Table 104 – Change in scallop revenues if YTF allocation is 90 percent of amount expected to be harvested for GB and SNE/MA stocks, and no specific allocation for CC/GOM YTF stock (*Sub-Option 1 -Groundfish Committee recommendation*)

Scallop	**Year**		
Scenario	2010	2011	2012
NCF=.2	$29,147,495	$36,312,238	$36,266,973
NCF=.24	$29,956,093	$35,030,399	$35,043,322
CF=.18	$37,053,589	$33,978,079	$37,276,812
	As Percent of Total Scallop Revenues		
NCF=.2	9%	7%	6%
NCF=.24	8%	7%	6%
CF=.18	12%	7%	7%

A similar analysis was performed for the groundfish fishery for the GB and SNE/MA yellowtail flounder stocks. In both stocks areas two calculations were developed. The first is a straightforward estimate of the value of each metric ton of yellowtail flounder based on 2007 and 2008 data. The second calculation determined the total value of all species landed on groundfish trips in the area, and then determined the value of this total per metric ton of yellowtail flounder landed. This high value is most appropriate for those vessels in sectors, or for FY 2012 when the hard TAC AM affects common pool vessels, since it shows the loss of all revenue if yellowtail flounder leads to a complete loss of access to a stock area. On Georges Bank this was further refined for common pool vessels by taking into account discard rates and the different management measures in the Eastern and Western U.S./Canada areas. Since the Eastern Area closes if the yellowtail flounder TAC is exceeded, all revenues were sacrificed from this area, while fishing continues in the Western Area. This provides a third, or expected, value per metric ton. In the SNE/MA area, only trips that landed yellowtail flounder were considered in the analysis. These values were multiplied by the allocations under consideration to determine the revenue reductions for the groundfish fishery under the proposed allocation and the three scallop management scenarios under consideration.

Results are summarized in Table 105 and Table 106. The value of each metric ton of yellowtail flounder to the groundfish fishery ranges from a low of $3,296 to a high of $41,176. GB yellowtail flounder is more valuable than SNE/MA yellowtail flounder because of the increased groundfish fishing opportunities on GB. The total losses to the fishery range from a low of $715,000 to a high of $16.9 million over the next three years under the three possible scallop management scenarios. To put these values in context, FY 2005 to FY 2007 groundfish revenues averaged $101 million and total revenues on groundfish trips averaged $158 million, but Amendment 16 may reduce groundfish revenues by 15% and total revenues by 18%. The changes estimated here thus fall in the range of less than one percent to 19.6% of groundfish revenues, and less than one percent to 11.9% of total revenues on groundfish trips.

Table 105 – Change in revenues on groundfish trips per mt of YTF; average of 2007 and 2008. See groundfish PDT report for details. For GB, expected revenues consider difference in management measures for common pool vessels between EGB and WGB.

	GB	SNE/MA
YTF Revenues/mt	$3,296	$3,895
Total Revenues/mt	$41,176	$28,708
Expected Revenues/mt	$12,674	

Table 106 – Reduction in groundfish revenues if scallop fishery is allocated 90 percent of expected harvest of YTF for GB and SNE/MA YTF stock areas. These values represent the difference between potential groundfish revenues if there is no scallop fishery catch of yellowtail flounder and the proposed allocation. Based on 2007/2008 revenues.

	Georges Bank			SNE/MA	
	Low	**High**	**Expected**	**Low**	**High**
NC, F=0.2					
2010	$326,304	$4,076,424	$1,254,726	$389,111	$2,867,929
2011	$670,406	$8,375,198	$2,577,892	$333,023	$2,454,534
2012	$1,047,139	$13,081,615	$4,026,530	$525,825	$3,875,580
NC, F=.24					
2010	$433,094	$5,410,526	$1,665,364	$473,243	$3,488,022
2011	$682,272	$8,523,432	$2,623,518	$343,539	$2,532,046
2012	$1,044,173	$13,044,557	$4,015,123	$529,331	$3,901,417
CL, F=0.18					
2010	$539,885	$6,744,629	$2,076,001	$627,485	$4,624,859
2011	$759,398	$9,486,950	$2,920,090	$455,715	$3,358,836
2012	$949,248	$11,858,688	$3,650,112	$529,331	$3,901,417

All of these estimates assume no changes in fishing behavior by either fishery. In both cases changes in fishing practices could mitigate potential revenue losses. For example, if the ratio of yellowtail flounder caught to scallops landed can be decreased through either gear modifications or fishing practices, then the scallop fishery will harvest more of its available yield prior to triggering any AMs that may be adopted for FY 2011 and beyond. If the groundfish fishery can do the same – reducing the yellowtail flounder caught while fishing for other species – the same result can be expected and revenue losses would not be as large as estimated here. There is evidence in observed groundfish fishing trips that this may be possible, at least for roundfish species.

Compared to the No Action alternative, this measure is likely to reduce scallop fishery revenues. Under No Action, no specific allocation is made to the scallop fishery and thus the scallop yield should approach that estimated for the adopted scallop management scenario. For the groundfish fishery the differences between this option and No Action are less certain. If an allocation is not made to the scallop fishery, then the overall yellowtail ACL would serve as the trigger for groundfish AMs. Since the scallop fishery presumably would still catch yellowtail flounder without any limit, it is possible that excessive yellowtail flounder catches would result in groundfish AMs and lost fishing opportunities for this fleet.

7.4.2.2 Commercial Fishery Effort Control Modifications

7.4.2.2.1 Option One – No Action

Under the No Action alternative, the impacts of the common pool effort controls would not differ from those described in Amendment 16. While these indicate that reductions in revenue can be expected for most vessels under the Amendment 16 provisions, no additional reductions would be likely to occur. As noted in Amendment 16, there is some uncertainty about these impacts given the uncertainty over sector membership.

Unlike the Proposed Action, under this option the Regional Administrator would not have the authority to modify trip limits and DAS counting in order to reduce the likelihood an ACL will exceeded or to facilitate harvesting an ACL. As a result, there is less likelihood that fishermen would choose to participate in a derby to use their DAS before any in-season adjustments were made. Fishermen would also have more ability to plan their business operations for the year without a concern that a trip limit or DAS counting change would invalidate plans. This may also influence the decision a permit holder makes on whether or not to join a sector. With less uncertainty about changes in the common pool regulations, more permit holder might choose not to join a sector.

7.4.2.2.2 Option Three – Modification to DAS Counting

Impacts on Common-Pool Vessels

Impacts of these measures, as descried here, are marginal impacts; that is, they are in addition to any changes in revenue that occur under Amendment 16. The economic impact of this option was evaluated the same way as for the Proposed Action (see section 6.4.1.2.1).

Trips that occurred that landed groundfish within the differential DAS area were counted at a rate of 2:1 and any trips landing pollock were adjusted to reflect the proposed pollock trip limit. No adjustment for GOM cod was required since the proposed action would retain the GOM cod trip limit at FY07 levels**.** The DAS allocations under both scenarios were the same since FW44 would not change initial allocations.

The analytical approach provides a basis of comparison between the effort control program as proposed under Amendment 16 and the proposed modifications under FW44. The approach is limited in that adjustments to fishing locations or strategies are not considered. Additionally, the possibility for leasing DAS to offset the impacts of either the simulated Amendment 16 or FW44 scenarios was not considered For this reason, the estimated impacts may reflect an upper bound condition in terms of adverse impacts.

As of September 1, 2009 there were 279 permits with Category A DAS allocations that had enrolled in the common pool. Of these permits 79 did not record any activity through a VTR during FY 2007. These permits were eliminated from further consideration. An additional 98 permits did not report any trip where groundfish, monkfish, or skates were landed and were also eliminated from further consideration. This left 104 current common pool permits that were retained for further analysis. Among the remaining 104 common pool members the majority (93) would not be affected either by the change in the pollock trip limit or the differential DAS counting area either because they either 1) did not fish for groundfish in the GOM, or 2) landed relatively low quantities of pollock, or 3) had sufficient DAS allocations so they were not constrained by DAS or 4) some combination of the three.

Among the 9 affected vessels the estimated reduction in total revenue ranged widely to approximately 10% to nearly 70%. Estimated revenue losses for about half of the vessels were less than 15% while revenue losses for the others, was much larger ranging between 33% and 70%.

Whether the current roster of vessels enrolled in the common pool is representative of the vessels that may end up in the common pool on May 1, 2010 is uncertain. For the most part, the current roster appears to be comprised of vessels that are primarily engaged in fisheries other than groundfish. During FY 2007 of the 200 vessels that showed any activity only 50 took any more than 1/3 of total trips in the GOM. These 50 vessels took 3,458 trips of which 3,200 were to a GOM statistical area. However, the majority of these GOM trips (2,428) did not land any groundfish, skates, or monkfish leaving a total of 772 trips where groundfish was landed. Note that cod was landed on every trip taken to the GOM that landed groundfish. However, the 800 pound trip limit was constraining on only 188 occasions. Pollock was landed on less than half (304) of the 772 GOM groundfish trips, but with the exception of 46 occasions landings of pollock were below the proposed 1,000 pound per day trip limit.

Impacts on Sector Membership

As of September 1, 2009, permits committed to sectors accounted for over 90 percent of the PSC for most stocks. As described in section 6.4.1.2.1, permit holders must make a decision whether to remain in a sector or to choose to fish under the common-pool effort controls by May 1, 2010. If the decision is based solely on GOM cod landings, the effect on probable sector membership of the proposed differential DAS counting measure and the proposed GOM cod trip limit can be evaluated. Table 107 shows the probable sector membership if the decision is based solely on the potential GOM cod landings under the effort control measures proposed as compared to the sector PSCs. This comparison assumes that every DAS is used on the GOM and the trip limit is caught on every DAS. Note that even with fewer vessels in sector than in the common pool, under all three scenarios modeled the sector total PSC is higher than the common pool total PSC. The proposed measures have more impact on those vessels with a high history of GOM cod landings and those vessels can catch more GOM cod in sectors than in the common pool. Conversely, the permits that remain in the common pool are those that do not have recent history (FY 1996 – FY 2006) of landing large amounts of GOM cod. As noted above, many of these permits fish in other areas.

Table 107 – Probable sector membership if decision is based solely on potential GOM cod landings

	800 lb./DAS	2:1 Diff DAS	800 lbs/DAS and 2:1 Diff DAS
Vessels in Common Pool w/DAS	812	862	666
Vessels in Sectors w/DAS	162	112	308
GOM Cod Common Pool PSC	37%	49%	14%
GOM Cod Sector PSC	63%	51%	86%

7.5 Social Impacts

The need to assess social impacts emanating from federally mandated fishing regulations stems from National Environmental Protection Agency (NEPA) and M-S Act mandates that the social impacts of management measures be evaluated. NEPA requires the evaluation of social and economic impacts in addition to the consideration of environmental impacts. National Standard 8 of the M-S Act demands that “Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of over fishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities” (16 U.S.C.§1851(2)(8)). The analysis that follows provides a context for understanding possible social impacts resulting from the proposed measures in Framework 44.

Amendment 13 identified five social impact factors: regulatory discarding, safety, disruption in daily living, changes in occupational opportunities and community infrastructure, and formation of attitudes. All of these factors can be affected by changes in management measures. Fishermen find regulatory discarding both distasteful and wasteful of valuable fishery resources. Modifications to daily routines can make long-term planning difficult. New gear requirements such as netting and some equipment must be ordered months in advance resulting in changes to daily routines when these modifications cannot be met in a time and cost efficient manner. Further the cost of making such changes may prove to be a burden for some vessel owners. Changes in management measures that limit access to fishing may increase the likelihood of safety risks. Increased risk can result when fishermen spend longer periods at sea in order to minimize steam time to and from fishing grounds, operate with fewer crew, and fish in poor weather conditions. Formation of attitudes refers to the positive or negative feelings or beliefs expressed by members of the communities that will be affected by the Proposed Action. The effect of the Proposed Action on these factors will be discussed below. It is important to note that, as in the case with the biological and economic impacts analyses for this framework, social impacts are very difficult to predict. FY 2010 will include many new regulations and new sectors, and these effects interact in a complex manner.

Amendment 13 also identified primary and secondary port groups that are most affected by changes in groundfish management. The criteria port groups identified for this action are discussed in Section 5.6.2. It not likely that this action would affect all of these port groups to the same extent. Those port groups that are more dependent on groundfish would likely have more social impacts than those that participate in a range of fisheries. Even among communities with similar dependence on groundfish, there are likely to be different impacts since some measures have localized impacts. The following discussion will also highlight the differences between port groups, where appropriate.

7.5.1 Social Impacts of the Proposed Action

7.5.1.1 ACL Specifications

7.5.1.1.1 Option Two – Northeast Multispecies Fishery ACL Specifications for Fishing Years 2010 – 2012

This option proposes to adopt specifications and ACLs for FY 2010 -2012. This measure includes not only the identification of ACLs as required by the M-S Act and as implemented by Amendment 16; it includes the allocation of yellow tail flounder between the groundfish and scallop fisheries as part of the ACL process. It also incorporates adoption of the incidental catch TACs for the special management programs that use Category B DAS, and it adopts the TACs for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder that are applicable to the U.S./Canada Resource Sharing Understanding. The social impacts of each of these elements will be discussed in this section.

Implementation of ACLs as required by the Magnuson-Stevens Act may have social impacts that are difficult to define. Since it cannot be determined whether the use of ACLs will change effort levels or allocation of the resource, the most likely type of impact is a change in the formation of attitudes toward the management process. The standardization of a process to determine fishing levels may lend a sense of legitimacy to fisheries management in the eyes of the public. However, the process for setting ACLs is quite complicated and technical, and some would-be public participants could be deterred from engaging in management forums.

The adoption of the ACLs may lead to concerns that the fishery is being managed in an overly conservative manner. This is not likely to occur until after stocks are rebuilt. Fishermen may view fishing at less than 75% of FMSY on a rebuilt stock as limiting their ability to benefit from rebuilding. This could affect attitudes towards the management program since it will be viewed as limiting occupational opportunities unnecessarily.

Because the ACLs are simply caps on the amount of catch that can occur for each stock in the fishery, the adoption of ACLs numbers itself does not have major social impacts. Rather, low ACLs drive conservative management strategies, and the methods for reducing effort or allocating the ACL are the largest contributors to impacts of a social nature. The sector and effort control systems for FY 2010 – 2012 were adopted in Amendment 16 and impacts of each measure were described in that document. Impacts of alternatives that would change allocations and management measures in FW 44 are analyzed below.

There is likely to be little difference between the social impacts of the Proposed Action and No Action. Under both circumstances, catches are limited, they may be viewed as conservative limits, and the complexity may deter participation in the management process. The relatively minor differences in catch levels are not likely to alter the perception of the management program.

7.5.1.1.1.1 Proposed Action - Yellowtail Flounder Allocation to the Scallop Fishery

This measure allocates a portion of the yellowtail flounder ACL to the scallop fishery to account for incidental catches in that fishery. In FY 2010, the allocations to the scallop fishery are considered an "other sub-component" and are not subject to specific scallop fishery AMs. In subsequent years the allocation is considered a sub-ACL and the scallop FMP will adopt AMs to control these catches. Also, scallop vessels are required to land all yellowtail flounder that is caught. The measure may distribute the catches differently than has been done in the past, which may have some social impacts on both fleets.

Allocations are proposed for two stocks - GB yellowtail flounder and SNE/MA yellowtail flounder – and are based on 100 percent of the amount the scallop fishery is expected to catch if they harvest the projected scallop yield in FY 2010, and 90 percent of the amount in FY 2011 and FY 2012. These amounts of yellowtail flounder were estimated by comparing recent discard rates, projected increases in scallop and yellowtail flounder abundance, and future scallop yields. The scallop fishery catch of CC/GOM yellowtail flounder is estimated to be a small amount and so a specific allocation is not made; catches are considered part of the "other sub-components."

In addition to specific concerns about catch levels and rebuilding timelines, when compared to No Action any measure that shifts allocation from one fishery to another may have impacts on some of the other social impact categories. *Changes in occupational opportunities* could occur if the allocation provides more opportunities in either fleet: if the scallop fishery is seen as advantaged from the allocation, then effort could shift into that fishery. *Formation of attitudes* could clearly be affected if constituents of either fishery feel disadvantaged by the measure with respect to the other fishery.

7.5.1.1.1.2 Sub-option Two – U.S./Canada Resource Sharing Understanding TACs

The proposed hard TACs for the U.S./Canada area are not expected to have significant social impacts. The TACs for EGB cod and haddock were determined in the same way as has been done in recent years. For GB yellowtail flounder, the TMG could not reach agreement on a TAC and so the TAC was set by the Council. TACs of the three co-managed species vary from year to year, and the FW 44 numbers are within the range of numbers that have been used in the past 5 years for cod and yellowtail flounder. For haddock, the allocation in the area is the largest in the most recent 5-year span. Although discarding may occur in the area as it does in the rest of the fishery, it is unlikely to be a special issue.

Although the Proposed Action would have short-term negative economic impacts in contrast to the No Action Alternative, the impacts should not be significantly different from those in the rest of the fishery in a way that would cause them to have unique social impacts. The long term impacts of the No Action Alternative are more likely to be negative than the Proposed Action. Stock rebuilding is likely to have positive social effects, as it will allow effort to increase in the area, and such rebuilding could be jeopardized by the No Action alternative.

7.5.1.2 Commercial Fishery Effort Control Modification

7.5.1.2.1 Option Two – Modification of Trip Limits

This option proposes to modify the trip limit for GOM cod to 800 lbs./DAS with a maximum of 4,000 lbs./trip. A trip limit for pollock is also adopted, at 1,000 lbs./DAS and 10,000 lbs./trip. These two trip limits will be implemented at the start of the fishing year. Finally, the yellowtail flounder trip limits applicable to scallop dredge vessels are removed and scallop vessels are required to land all legal-sized yellowtail flounder. As recommended by the Groundfish Committee, this regulation would apply to all scallop vessels, both limited access and general category.

Trip limits are most likely to affect *regulatory discarding* and *formation of attitudes*. In general, trip limits can affect the structure of a fishery. If the trip limit is set very low, the inshore sector of the fleet can sometimes manage to fish economically, while the offshore sector of the fleet cannot cover trip expenses to direct fishing effort on the species managed by the trip limit. This can change the structure of revenues generated in the fishery and can ultimately change the long-term structure of the fishery itself.

Social impacts have resulted because the trip limits themselves hold a socially-undesirable characteristic – *regulatory discarding*. The impacts of regulatory discarding are discussed *infra*. In the past, different trip limits for cod on Georges Bank and in the Gulf of Maine also have created perceptions of inequity between some sectors of the fishery. Although they are separate stocks of cod and there are many reasons for different trip limits, codfish are marketed similarly no matter where they are caught (sometimes prices may vary depending on how they are caught). Fishermen in the Gulf of Maine may be disadvantaged in terms of the fresh fish market for cod. Moreover, larger vessels from Gulf of Maine ports may be able to fish on Georges Bank and land more cod, increasing perceptions of inequity in some communities. This often exacerbates conflicts between sectors of the industry, which create social impacts in the form of intracommunity conflicts and loss of community cohesion.

The extent of the impacts of proposed trip limits will depend upon which permits ultimately fish in sectors. The sector rosters may change before the beginning of the fishing year since permits can be withdrawn from sectors until May 1, 2010. Setting low trip limits for GOM cod and pollock may cause some vessels that would have otherwise opted to fish in the common pool to register for sectors, since the amount of these valuable species that they will be able to catch will decrease. The social impacts of sectors themselves are analyzed in Amendment 16, and those impacts will be more pronounced if more vessels join sectors as a result of this trip limit measure.

One likely result of the 800 lb./trip limit is that GOM cod *regulatory discards* would remain high. Current stock size is projected to be close to, or perhaps even higher than, SSB_{MSY} (see Figure 25), yet the proposed trip limit is the same as that adopted in Amendment 13 when stock size was less than one-fourth the current projected stock size. To the extent that regulatory discards of GOM cod are proportional to increases in stock size, discard rates for common pool vessels are likely to increase under this measure from recently seen values. Under the No Action alternative, the trip limit is larger, so regulatory discards resulting from the trip limit would likely be smaller; this measure would probably increase discards when compared to No Action as well.

This measure also adopts a pollock trip limit of 1,000 lbs./DAS and 10,000 lbs./trip. Under existing regulations and the No Action alternative there is no trip limit for pollock. It is not clear how much pollock the vessels in the common pool can catch absent a trip limit, and so it is difficult to tell whether *regulatory discards* will increase dramatically as a result of this measure. It is not clear if these identified common pool vessels will target pollock if a trip limit is not adopted, nor is it clear that other vessels will leave sectors based solely on potential pollock catches. Since there is no trip limit for pollock under No Action, the Proposed Action is likely to negatively affect attitudes resulting from regulatory discards when compared to No Action.

It is difficult to determine whether fishing behavior will be significantly altered by the measure requiring scallop vessels to land all yellowtail flounder. If fishing behavior is not greatly altered, catches within the access area should not change and *regulatory discards* will be converted to landings. Adopting this requirement should reduce *regulatory discards* of yellowtail flounder as compared to No Action – almost all yellowtail flounder caught by limited access vessels is presently discarded, while general category scallop vessels are not allowed to land yellowtail flounder and all that they catch is discarded. That change would have positive social impacts, both on the scallop fleet that reduces discards and on the groundfish fleet which will have a positive view of the reduction in discards. But if the vessels choose to take advantage of this regulation and target yellowtail flounder then catches could increase and if this occurs in the access areas it may reduced the contribution of those areas to groundfish rebuilding. This could be an issue for CAII. Recent assessments indicate that the GB yellowtail flounder stock is heavily concentrated in this area. To the extent that the area is providing benefits to rebuilding by serving as a refuge for yellowtail flounder, increased targeting by any vessels in this area may slow rebuilding. It is not clear, however, that the area is serving in this fashion. Not only would slower rebuilding result in decreased catch for fishermen (which would have similar impacts to the ACL measures described above), but the long-term positive social impacts anticipated by the rebuilding program will be delayed.

7.5.1.2.2 Option 4 – Effort Control Measure Adjustments

This measure authorizes the Regional Administrator to adjust trip limits or DAS counting rates during the fishing year in order to facilitate harvesting the ACL or to reduce the likelihood the ACL is not exceeded. Since sector membership will not be known with certainty until May 1, 2010, there is more uncertainty about the effectiveness of the effort control measures than with prior management actions. This option gives the Regional Administrator two tools that can be readily used should the measures prove to be misaligned with fishing activity in the common pool. The result is that there should be more certainty about maintaining catch at or below the applicable ACLs, increasing the likelihood that fishing mortality targets will be achieved.

This measure is administrative in nature and is not, in itself, likely to have negative impacts on any of the social factors with the possible exception of *formation of attitudes*. If the RA is perceived to overstep its authority or make in-season modifications that are not satisfactory to fishery participants, such perceptions could lead to hostility toward the management agency. However, this is not guaranteed to happen because other social factors may be positively impacted.

Disruptions in daily living, for example, could be mitigated by this measure. One rationale for endowing this authority upon the RA is to slow fishing effort throughout the year in order to avoid a derby fishery after the hard TAC AM is implemented in 2012. A derby fishery would cause major disruptions in daily living by concentrating fishing activity at the beginning of a year. By limiting trip limits, or charging high DAS counting rates, fishermen might be dissuaded from fishing during periods these regulations are in effect. Conversely, if the RA implements severe measures during the fishing year that prohibit some fishermen from making profitable trips, disruptions could actually increase because of this measure. As noted in the economic impacts (section 6.4.1.2.2), authorizing in-season changes could actually increase the likelihood of a derby fishery if fishermen rush to fish before an in-season change is adopted.

Finally, *safety* could have positive impacts in a similar manner as *disruptions in daily living*. The possibility of a derby fishery has negative safety implications as fishermen race to fish often in spite of poor weather or crew conditions, so any measure that reduces its possibility will have a positive impact on safety.

As a result of these concerns, the impacts of this measure are likely ot be negative when compared to No Action.

7.5.2 Social Impacts of Alternatives to the Proposed Action

7.5.2.1 ACL Specifications

7.5.2.1.1 Option One – No Action

The No Action alternative for specifications, if adopted, would entail the failure by the Council to adopt ACLs for the fishery and, as a result, implementation of ACLs by NMFS, as well as a lack of TACs for the U.S./Canada area and no special allocation of yellowtail flounder to the scallop fishery. A description of the social impacts of using ACLs in the management of the groundfish fishery can be found in Amendment 16.

The Amendment 16 analysis of ACLs stated that, "The adoption of the ABC control rules may lead to concerns that the fishery is being managed in an overly conservative manner." The No Action alternative contemplates the use of the ABC numbers in lieu of the ACLs proposed in Option 2. It should be noted that the proposed ACLs are actually more conservative than the ABCs due to the fact that the former are set lower in order to account for management uncertainty.

7.5.2.2 Commercial Fishery Effort Control Modification

7.5.2.2.1 Option One – No Action

Under the No Action alternative, the effort control measures adopted by Amendment 16 would apply to common-pool groundfish fishing vessels – that is, those that do not join a sector. These measures were evaluated in Amendment 16 to determine the social impacts.

Based on sector rosters as of September 1, 2009, a large number of permits have been committed to sectors. These commitments can still be reversed until May 1, 2010, so sector membership is still not known with certainty. The permits that have not committed to sectors are described in

Section 5.6.4. The social impacts to the fishery will be determined, in large part, by the number and makeup of permits that ultimately fish in sectors in 2010.

To the extent fishing behavior changes in ways not predicted by the analyses in Amendment 16, there may be less certainty about achieving the mortality objectives of Amendment 16 if the No Action alternative is selected. A failure to meet mortality objectives would result in further decreases to fishing effort in the future, and a delayed appreciation on the benefits of a rebuilt fishery.

No Action could lead more people to be in the common pool in comparison with the other alternatives. This could have social impacts, although it is not possible to determine what the exact impacts would be. The social impacts of sectors are explored in Amendment 16; if more people join sectors, these impacts would be amplified. Such impacts are complex and will depend upon the success of rebuilding strategies and sector implementation. Since sectors were projected to have primarily positive social impacts, especially in the long-term, it can be assumed that the No Action alternative will lead to fewer long-term positive impacts.

7.5.2.2.2 Option Three – Modification to DAS Counting

This measure proposes to count common-pool vessel DAS at a 2:1 rate in the GOM differential DAS area at the beginning of the fishing year. This measure will reduce fishing effort by common pool vessels in this area.

Changes in the way that DAS are counted can sometimes equate to DAS reductions. If DAS are counted at a 2.25:1 rate year-round in the inshore Gulf of Maine area, for example, vessels that are able to fish only in that area effectively receive a further reduction in the DAS available for them to use. For vessels that may be able to access other areas to fish at a 1:1 DAS counting rate, it is likely that they will move to those areas where the regulation may not impact them. This could be farther from shore, possibly compromising their *safety*.

Social impacts of DAS reductions tend to be more far-reaching and long-term in nature than social impacts from other management measures like trip limits, gear restrictions, and seasonal area closures. They tend to have the most significant impacts on *disruption in daily living* and *changes in occupational opportunities and community infrastructure*, although as mentioned they also can affect *safety*. Unlike a revised trip limit, though, this measure is not likely to lead to increased *regulatory discards* of GOM cod or pollock. Impacts on the other factors result from direct reductions in groundfish fishing opportunities and revenues for vessels that are most active in the fishery. Reductions in groundfish fishing opportunities through the loss of DAS also compromise vessels' flexibility and can have direct impacts on fishing activity within a port, consequently impacting the shoreside facilities that are dependent on the affected vessels. Other impacts of DAS reductions include increased uncertainty and instability in the fishery and/or community; problems finding and keeping crew members on a year-round basis; social impacts related to family and business financial problems; overall increased stress at the individual, family, and community level; and reductions in perceptions about job satisfaction.

Indirect negative social impacts resulting from DAS reductions relate to adaptations that vessels make to compensate for reduced opportunity and reduce income, which can oftentimes increase their risk-taking and compromise their safety at sea. As income is reduced, some fishermen will try to minimize their operating costs in order to stay viable, sometimes reducing or eliminating crew, especially on smaller vessels. More owners of smaller vessels could be forced to fish alone for some or all of the year. Vessels may also try to maximize their remaining DAS by fishing during the winter when prices are usually better. Winter weather is more extreme and less predictable, increasing dangers that fishermen may encounter.

In addition, the disproportionate impacts of DAS reductions or differential DAS counting areas can create perceptions of inequity, which often exacerbate social impacts occurring in communities involved in groundfish fishing harvesting. Some people think that DAS allocations from Amendments 5 and 7 were unfair and created inequities and tensions between sectors involved in the fishery. Those who switched from groundfish to other fisheries with the decline of the groundfish stocks feel that they were punished by not receiving their true historical allocation of DAS. Many fishermen feel that they have sacrificed more than their share to rebuild the resource and are concerned about their future ability to realize the benefits of their sacrifices. Vessels that stand to be the most impacted by differential DAS counting in this framework are those that currently fish in the inshore GOM. As a result, some vessel owners may feel unfairly treated and disproportionately impacted by the capacity alternatives.

The economic impacts of DAS reductions that are being considered in this amendment are discussed in the economic impacts section. Certainly the most significantly impacted vessels from an economic perspective will be those that currently fish in the inshore GOM. Similarly, the most significantly impacted communities will be those that are geographically proximate to the area or that serve as the homeport for vessels that fish there. Northern New England ports such as Portland, Boston, Gloucester, the NH Seacoast, and Portsmouth, exhibit a relatively high dependence on the inshore GOM fishing area and the GOM cod fishery.

With respect to the potential landings of GOM cod by vessels committed to sectors as of September 1, 2009, the maximum impact of this measure would occur if these vessels used all their DAS in the differential DAS area. Effectively this would reduce the potential landings in half, and would be the equivalent to a 50% DAS cut for vessels that fish in the area. When combined with the proposed 800 lbs./DAS trip limit the results show a larger decline. However, if vessels can shift effort into other areas or other stocks, the impacts will be lessened.

7.6 Impacts on Other Fisheries

The M-S Act requires that fishery management plans or amendments assess, specify, and describe the likely effects, if any, of the conservation and management measures on participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of the participants. Amendment 16 described the impacts of the proposed management program on several fisheries. Since this action adopts measures designed to make Amendment 16 more effective, and to achieve the mortality targets in the amendment, it is not expected to result in substantially different impacts on other fisheries.

The Mid-Atlantic Fishery Management Council (MAFMC) manages several fisheries that take place off the coast of southern New England. The geographic range of these fisheries overlaps the range of the multispecies fishery, and many multispecies permit holders participate in these other fisheries. The principal fisheries managed by the MAFMC that may be affected by this action are for:

- Dogfish (jointly managed with the NEFMC)
- Scup
- Black Sea Bass
- Squid
- Summer Flounder

Three fisheries managed by the NEFMC – monkfish, skates, and the scallop fishery – may also be affected by this action, but as described below these effects are not expected to differ from those described in Amendment 16.

7.6.1 Mid-Atlantic Fisheries

The Proposed Action implements specifications (OFLs/ABCs/ACLs) for groundfish stocks as required by Amendment 16. These values are consistent with the fishing mortality targets adopted by that action. AS such, the impacts on other fisheries – including those managed by the MAFMC – are expected to be consistent with those described in Amendment 16. In general, the overall concern is that the ACLs, and management measures designed to restrict catches to those ACLs, may limit fishing opportunities to such an extent that effort is redirected into other fisheries. Since many of these fisheries are managed through quotas, it is not likely that such effort shifts will lead to overfishing. It is more likely that any substantial effort shifts would have an adverse impact on the economic performance of the fishery as the quota is distributed among more vessels and/or trips. It could also lead to more rapid closures as quarterly or seasonal quotas may be reached more quickly, interrupting the supply of these products to markets.

The adoption of lower trip limits for GOM cod and pollock are not expected to have substantial impacts on the MAFMC fisheries. These measures apply only to common pool vessels, and based on the sector rosters available as of September 1, 2009 the active vessels in this category are a relatively small number of permits. Many of them do not fish in the GOM, the primary area where these stocks are caught, so the measure will have little effect on them. And it is not likely that the vessels that are affected will relocate to the SNE area to fish on MAFMC-managed stocks.

7.6.2 Scallop Fishery

The scallop fishery will be directly affected by the decision on the amount of yellowtail flounder to allocate to the groundfish and scallop fisheries. These impacts are described in the sections 6.1 through 6.5.

7.6.3 Skate Fishery

The skate fishery could be affected by effort shifts into that fishery, as described in Amendment 16. On the whole, the Amendment 16 effort reductions are expected to benefit skate stocks. This action adopts specifications consistent with Amendment 16 and no impacts beyond those described in the Amendment are expected.

7.6.4 Monkfish

This action is not expected to affect the monkfish fishery beyond the impacts described in Amendment 16.

7.7 Cumulative Effects Analysis

7.7.1 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 44 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 5.0 (Description of the Affected Environment), the VECs that exist within the groundfish fishery are identified and the basis for their selection is established. Those VECs were identified as follows:

1. Regulated groundfish stocks (target and non-target);
2. Non-groundfish species (incidental catch and bycatch);
3. Endangered and other protected species;
4. Habitat, including non-fishing effects; and
5. Human Communities (includes economic and social effects on the fishery and fishing communities).

<u>Temporal Scope of the VECs</u>
While the effects of historical fisheries are considered, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. For endangered and other protected species, the context is largely focused on the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, this analysis examines the period between implementation of this amendment (May 1, 2010) and the anticipated rebuilding of the fishery in 2014. This date was chosen because after the fishery is rebuilt, changes to the management of groundfish that are not possible to predict at this time are likely.

Geographic Scope of the VECs

The geographic scope of the analysis of impacts to regulated groundfish stocks, non-groundfish species and habitat for this action is the total range of these VECs in the Western Atlantic Ocean, as described in the Affected Environment section of the document (section 5.0). However, the analyses of impacts presented in this amendment focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources occurs. For endangered and protected species, the geographic range is the total range of each species (section 5.0).

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 **Error! Reference source not found.**) 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 Proposed Action and alternatives.

A description of past, present and reasonably foreseeable future actions is presented immediately below in Table 108 and more thoroughly in Appendix IV. 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 amendment is included. The culmination of all these factors is considered when making the cumulative effects assessment.

7.7.2 Past, Present and Reasonably Foreseeable Future Actions

Table 108 summarizes the combined effects of other past, present and reasonably foreseeable future actions that affect the VECs, i.e., actions other than those alternatives under development in this document (a summary of the primary past, present and reasonably foreseeable future actions effecting this amendment can be found in Appendix IV). FW 44, if approved, would be implemented in conjunction with Amendment 16 to the FMP and approved sector operations plans for FY 2010.

Note that most of the actions effecting this amendment and considered in Table 108 come from fishery-related activities (e.g., Federal fishery management actions). As expected, these activities have fairly straightforward effects on environmental conditions, and were, are, or will be taken, in large part, to improve those conditions. The reason for this is the statutory basis for Federal fisheries management - the re-authorized 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 108 - Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 44 (based on actions listed in Appendix I).

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 and improved habitat protection 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 **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 thus limit 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 controls have curtailed fishing opportunities	**Mixed** Fishery resources continue to support communities but increasing effort controls combined with non-fishing impacts such as rising fuel costs have had a negative economic impact	**Short-term Negative** As effort controls are maintained or strengthened, economic impacts will be negative **Long-term Positive** As stocks improve, effort will likely increase which would have a positive impact	**Short-term Negative** Lower revenues would likely continue until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies

<u>Impact Definitions:</u>
-Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species: positive=actions that increase stock size and negative=actions that decrease stock size
-Habitat: positive=actions that improve or reduce disturbance of habitat and negative=actions that degrade or increase disturbance of habitat
-Human Communities: positive=actions that increase revenue and well being of fishermen and/or associated businesses negative=actions that decrease revenue and well being of fishermen and/or associated businesses

7.7.3 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 109) summarizes the added effects of the condition of the VECs (i.e., status/trends from section 5.0) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 108 above). The resulting CEA baseline for each VEC is exhibited in the last column (shaded). In general, straight-forward 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 5.1 and 5.6, respectively. As mentioned above, this cumulative effects baseline is then used to assess cumulative effects of the proposed management actions below in Table 109.

Impact Definitions for Table 109 below:

Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species	Positive = actions that increase stock size
	Negative = actions that decrease stock size
Habitat	Positive = actions that improve or reduce disturbance of habitat
	Negative = actions that degrade or increase disturbance of habitat
Human Communities	Positive = actions that increase revenue and well being of fishermen and/or associated businesses
	Negative = actions that decrease revenue and well being of fishermen and/or associated businesses
All VECs	Mixed=both positive and negative

Table 109 - **Cumulative effects assessment baseline conditions of the VECs**

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 108)	Combined CEA Baseline Conditions
Regulated Groundfish Stocks	**Georges Bank Cod**	Overfished and overfishing is occurring.	**Negative** – short term Several stocks are currently overfished, have overfishing occurring, or both; **Positive** – long term Stocks are being managed to attain rebuilt status	**Negative** – short term Overharvesting in the past contributed to several stocks being overfished or where overfishing is occurring; **Positive –** long term Regulatory actions taken over time have reduced fishing effort and with the addition of Amendment 16, stocks are expected to rebuild in the future
	Gulf of Maine Cod	Not overfished but overfishing is occurring.		
	Georges Bank Haddock	Not overfished and overfishing is not occurring.		
	Gulf of Maine Haddock	Not overfished and overfishing is not occurring.		
	Georges Bank Yellowtail	Overfished and overfishing is occurring.		
	SNE/Mid-Atlantic Yellowtail	Overfished and overfishing is occurring.		
	Cape Cod-Gulf of Maine Yellowtail	Overfished and overfishing is occurring.		
	American Plaice	Not overfished and overfishing is not occurring.		
	Witch Flounder	Overfished and overfishing is occurring.		
	Georges Bank Winter Flounder	Overfished and overfishing is occurring.		
	Gulf of Maine Winter Flounder	Overfished and overfishing is occurring.		
	SNE/Mid-Atlantic Winter Flounder	Overfished and overfishing is occurring.		
	Acadian Redfish	Not overfished and overfishing is not occurring.		
	White Hake	Overfished and overfishing is occurring.		
	Pollock	Not overfished but overfishing is occurring.		
	Northern Windowpane	Overfished and overfishing is occurring.		
	Southern Windowpane	Not overfished but overfishing is occurring.		
	Ocean Pout	Overfished but overfishing is not occurring.		
	Atlantic Halibut	Overfished but overfishing is not occurring.		

Table 109 Continued

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 108)	Combined CEA Baseline Conditions
Non-groundfish Species (principal species listed in section 5.1.9)	**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	Winter, thorny and smooth skates are overfished and thorny is also subject to overfishing. Barndoor skate is not overfished and is rebuilding toward biomass target. Little skate is not overfished, although it is close to the overfished biomass threshold. Clearnose and rosette skates are not overfished and overfishing is not occurring.		
Habitat		Fishing impacts are complex and variable and typically adverse (see section 5.1.4); 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.	**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 most recent stock assessment for harbor porpoise shows that takes are increasing and nearing PBR.		
	Pinnipeds	ESA classification: Endangered, number of nesting females below sustainable level; taken by *Loligo* trawl		

Table 109 Continued

VEC	Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 108)	Combined CEA Baseline Conditions
Human Communities	Complex and variable (see Section 5.6). Although there are exceptions, generally groundfish landings have decreased for most New England states since 2001. Declines in groundfish revenues since 2001 have also occurred in all states except CT.	**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

7.7.4 Summary Effects of Framework 44 Actions

The alternatives contained in Framework 44 can be divided into two broad categories. First, this action adopts specifications for the fishery for FY 2010 - FY 2012. Second, the action adopts additional management measures for vessels that do not join sectors.

The adoption of fishery specifications for FY 2010 – FY 2012 completes actions called for by Amendment 16 in order to fulfill M-S Act requirements. 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 uses available data to translate those mortality targets into specific amounts of fish. These quantities must be defined in order to implement the ACLs and AMs called for in the amendment. The ACLs identified are thus consistent with the amendment. Other elements of this process include defining incidental catch TACs for programs using Category B DAS, allocating yellowtail flounder to the groundfish and scallop fisheries, specifying U.S./Canada TACs, and promulgating the TAC for the CAI Hook Gear Haddock SAP. In general, the adoption of all of these specifications will benefit groundfish stocks because collectively they make it more likely that mortality targets will not be exceeded. They are not likely to impact non-groundfish stocks, protected species, or habitat to any great extent when compared to the No Action alternative, since these proposed specifications differ only slightly from the No Action alternative. In almost all cases the specifications will have negative impacts on communities in the short-term as they further reduce expected landings and revenues. In the long-term however, communities should ultimately benefit form rebuilding progress.

The second broad category of measures adopted by this action is modifications to effort controls. Changes to the GOM cod and pollock trip limits, and the ability of the Regional Administrator to adjust trip limits and DAS counting in-season, are designed to reduce the likelihood that ACLs for vessels not in sectors will be exceeded. These measures are expected to have positive benefits for groundfish stocks, since if catches remain at or below the ACL it is more likely that mortality targets will be met and rebuilding efforts will be successful. Removing the yellowtail flounder trip limit for limited access scallop vessels is designed to reduce discards of this species. This will also benefit groundfish stocks, since catches can be more easily estimated from landings as opposed to discards. None of these measures are expected to appreciably affect non-groundfish stocks, protected species, or EFH. The effort control modifications are expected to have negative impacts on communities as they reduce landings in the short-term and increase uncertainty over the possibility of in-season adjustments. Requiring limited access scallop vessels to land yellowtail flounder may provide a marginal benefit to communities from increased revenues, but the relative value of scallops and yellowtail flounder mean that any increases will be only a small portion of total trip revenue.

7.7.5 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 110 below is provided as a summary of likely cumulative effects found in the various groups of management alternatives contained in Framework 44. Impacts are listed as no impact/neutral, positive, negative, or mixed. Impacts listed as no impact/neutral include those alternatives that have no impact or have a neutral impact (neither positive nor negative). Impacts listed as mixed contain both positive and negative impacts. The resultant cumulative effect is the CEA baseline that, as described above in Table 109, represents the sum of the past, present, and reasonably foreseeable future (identified hereafter as "other") actions and conditions of each VEC. When an alternative has a positive effect on a VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with the "other" actions that were also designed to increase stock size. In contrast, when an alternative has a negative effect on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the "other" actions. The resultant positive and negative cumulative effects are described below for each VEC and are exhibited in Table 109.

<u>Managed Resources</u>

The adoption of ACLs for FY 2010 – 2012, including the allocation of yellowtail flounder to the scallop fishery, the setting of U.S./Canada TACs, are expected to have positive impacts on the managed groundfish resources. These measures all increase the likelihood that mortality targets will be achieved and should continue groundfish rebuilding. The commercial fishery effort control changes (modifying GOM cod and pollock trip limits, and allowing in-season adjustments of certain effort controls) are also expected to have positive impacts as they reduce the risk that ACLs will be exceeded. Changing the trip limits may increase discards for GOM cod and pollock but the benefits of keeping catches below ACLs are excepted outweigh the disadvantage of increased discards. There is uncertainty regarding the effectiveness of Amendment 16 measures that will be implemented in conjunction with FW 44, because the levels of participation in sectors and the common pool were not known at the time of Amendment 16 analysis. Notwithstanding such uncertainty, both the sectors and common pool components of the fishery will be subject to management measures that the analysis indicates will be effective in controlling fishing effort. In addition to the measures implemented for the common pool in FW 44, the relatively small amount of catch that is likely to be specified for the common pool limits the potential impact of management uncertainty for the common pool.

Non-Target Species

The adoption of fishery specifications proposed is not expected to have any impacts on non-target species. The specifications implement mortality objectives adopted in Amendment 16 and thus are not expected to have any impacts bond those described in that action. Modifying effort controls is not expected o impact non-target species. These changes only affect fishing by a small number of groundfish permit holders that remain in the common pool and provided rebuilding continues there is not expected to be additional impacts on non-target species.

Protected Resources

Proposed changes to fishery specifications could have varying impacts on protected species. While the setting of ACLs is not expected to have nay impacts, allocating yellowtail flounder to the scallop fishery could have mixed or positive effects. In future years, these allocations could constrain scallop fishing activity if scallop vessels cannot keep bycatch to less than the allocation because excessive catches could trigger AMs. While reduced scallop fishing activity might benefit protected species such as turtles, the exact impacts could depend on how effort shifts in response to any AMs. The modifications to effort controls could also have either mixed or no impacts, depending how effort shifts in response to the changed regulations. In this case, because the changes only affect the small number of vessels expected to fish within the common pool, any impacts are expected to be minor.

Habitat, Including EFH

None of the fishery specifications measures are expected to substantial impacts to habitat or EFH; only the allocation of yellowtail flounder may have slight beneficial impacts. Generally, the modifications to the effort controls are expected to have neutral or no impacts, since these minor changes only affect a small number of vessels that choose to fish in the common pool.

Human Communities

The specifications are expected to have long-term positive impacts on human communities as they promote stock rebuilding, but in the short-term revenues are lower that would be expected under the No Action alternative. The allocation of yellowtail flounder to the scallop fishery will have mixed impacts, as it could restrict scallop fishing activity in FY 2011 and FY 2012 but over the long term should promote stock rebuilding and make more yellowtail flounder available to all users. Specifying U.S./Canada TACs is not expected to have significant social impacts.

Changes to the commercial fishery effort control measures are expected to have negative impacts on communities. While the measures may apply to only a small number of permits that remain in the common pool, reducing trip limits for GOM cod and pollock will reduce revenues for these vessels and will increase discards, both negative factors for communities. Allowing in-season changes will also increase uncertainty over business planning and could lead to derby effects if permit holders choose to fish before any in-season changes are made.

Table 110 - Cumulative effects expected on the VECs.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
FISHERY SPECIFICATIONS AND ACLS FOR FY 2010 – FY 2012	FISHERY SPECIFICATIONS	Positive – revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts	No Impact/Neutral – provided rebuilding continues, additional impacts to non-target species are not anticipated	No Impact/Neutral – provided rebuilding continues, additional impacts to protected species are not anticipated	No Impact/Neutral – provided rebuilding continues, additional impacts to habitat are not anticipated	Positive – Overall revenues will increase as stocks rebuild however, revenues under the revised specs would be less than no action
	YELLOWTAIL FLOUNDER ALLOCATIONS FOR THE SCALLOP FISHERY	Positive - allocation of ACL to groundfish and scallop fisheries reduces likelihood yellowtail flounder mortality targets will be exceeded	No Impact/Neutral – Unlikely to have significant impacts on scallops and other non-target species	Mixed/Positive – May marginally reduce scallop dredge effort if yellowtail flounder allocation restricts fishery	No Impact/Neutral – provided rebuilding continues, additional impacts to habitat are not anticipated	Mixed – allocation may limit access to scallop and groundfish resources but long-term rebuilding benefits will be positive
	U.S./CANADA RESOURCE SHARING UNDERSTANDING TACS	Positive – specification of TACs ensures combined U.S./Canada catches of EGB cod, haddock, and GB yellowtail flounder are consistent with mortality targets	No impact/neutral – limiting catches of these stocks unlikely to affect non-target species compared to No Action	Mixed/ Unknown- Specification of TACs does not appreciably change fishing effort in GB area compared to No Action	No Impact/Neutral – Specification of TACs does not appreciably change fishing effort in GB area compared to No Action	No impacts/ neutral – Measure promotes stock rebuilding, but little difference from No Action alternative.

Management Measure		VECs				
		Managed Resources	Non-target Species	Protected Resources	Habitat Including EFH	Human Communities
COMMERCIAL FISHERY EFFORT CONTROL MODIFICATIONS	MODIFICATION OF TRIP LIMITS	Positive – reducing trip limits for GOM cod and pollock reduces risk common pool vessels will exceed their ACL; increases likelihood mortality targets will be met; but will likely increase discard rates; requiring limited access scallop vessels to land yellowtail flounder will reduce discards	No Impact/Neutral – provided rebuilding continues, additional impacts to non-target species are not anticipated	Mixed– unknown how effort may redistribute as a result of trip limit changes; only affects small number of vessels that do not fish in sectors	No Impact/Neutral – provided rebuilding continues, additional impacts to habitat are not anticipated	Negative – reduced trip limits make common pool DAS less profitable, reduces fishing opportunities
	EFFORT CONTROL MEASURE ADJUSTMENTS	Positive – Ability to make in-season adjustments provides flexibility to make it more likely mortality objectives will be achieved	No Impact – 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	Negative – possibility of in-season adjustments create additional uncertainty for planning fishing operations

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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 implements specifications for those measures that are designed in a way to maximize optimum yield to the extent practicable 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.

This action also adopts modifications to the effort control system for common pool vessels that was designed in Amendment 16. The purpose of the modifications in trip limits is to prevent overfishing by the common pool in accordance with this standard. By adjusting measures to meet mortality targets, this action will facilitate rebuilding of groundfish stocks and the harvesting of optimum yield from the fishery.

Conservation and management measures shall be based on the best scientific information available.

The proposed action is based on the most recent estimates of stock status available for each of twenty stocks included in the management unit. These estimates are in the form of information provided by the Northeast Fisheries Science Center in the GARM III proceedings. In the case of Atlantic wolffish, stock status was estimated by the NEFSC in the proceedings of the Data Poor Working Group (DPWG). For all stocks, stock size and fishing mortality in calendar year 2007 was estimated based on catch, trawl survey, observer, and other data through 2007. Management targets for this action are also based on the results of the GARM III and the DPWG, which contain a comprehensive review of fishing mortality thresholds and biomass targets for the groundfish complex.

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 proposed action manages each individual groundfish stock as a unit throughout its range. Management measures specifically designed for one stock, including ACLs and trip limits, are applied to the entire range of the stock. In addition, the groundfish complex as a whole is managed in close coordination. Management measures are designed and evaluated for their impact on the fishery as a whole.

Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
The proposed management measures do not discriminate between residents of different states. They are applied equally to all permit holders, regardless of homeport or location. While the measures do not discriminate between permit holders, they do have different impacts on different participants. This is because of the differences in the distribution of fish and the varying stock levels in the complex. For example, the measures designed to meet mortality targets on GOM cod have more impacts on common pool fishermen who target that stock. Some of these impacts may be localized, as often communities near the stock may have developed small boat fisheries that target it. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. Even if the measures are designed to treat all permit holders the same, the fact that fish stocks are not distributed evenly, and that individual vessels may target specific stocks, means that distributive impacts cannot be avoided.

Conservation and management measures shall, where practicable consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

The trip limits described in Section 3.2.1 and any further modification to effort controls implemented by the Regional Administrator under Section 3.2.2 could reduce the efficiency of fishing vessels. These measures are considered practicable since they allow management measures to be more selective in this multispecies fishery. By reducing the possession limits for stocks such as GOM cod or pollock, there is less of a need for overall reductions in fishing effort which allows the harvest of healthier stocks such as GB haddock. None of the measures in this action have economic allocation as their sole purpose – all are designed to contribute to the control of fishing mortality.

Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The primary effort controls used in this management plan – effort controls and sectors - allow each vessel operator to fish when and how it best suits his or her business. Vessels can make short or long trips, and can fish in any open area at any time of the year. The measures allow for the use of different gear, vessel size, and fishing practices. The specific measures adopted in this action do not reduce this flexibility.

Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
While some of the measures used in the management plan, and proposed by this action, tend to increase costs, those measures are necessary for achieving the plan's objectives. As an example, measures that reduce the efficiency of fishing vessels, including trip limits and any future in-season adjustments by the RA, tend to increase the costs of fishing vessels since for a given amount of time fishing catches are reduced. These measures accomplish other goals, however, by keeping catch within mortality targets and allowing rebuilding programs to continue. The measures do not duplicate other regulatory efforts. Management of multispecies 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 ACLs and maintaining existing rebuilding programs. The expected benefits are greater in the long-term if stocks are rebuilt, though it is clear there are significant 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 proposed action will restrict fishing activity through the imposition of additional restrictions on possession limits, allowable catches, and other measures. Analyses of the impacts of these measures show that landings and revenues are likely to decline for many participants in the upcoming years of the rebuilding program. 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.
The measures allocating yellowtail flounder to the scallop fishery are expected to reduce bycatch by encouraging innovation in the scallop industry and by requiring all bycatch to be landed. While the adoption of additional trip limits may increase the ratio of discard to kept catch for GOM cod and pollock, these restrictions were adopted to discourage targeting and contribute to rebuilding objectives. 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 the benefits from those programs are expected to outweigh any increase in discards from the trip limits imposed by this action.

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 this action. 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 Proposed Action, in conjunction with

Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

Some members of the public expressed concern that allowing the RA to make in-season adjustments to effort control measures could lead to a derby fishery. While the fear of a shut-down or the imposition of extremely strict regulation could lead fishermen to try and use their allocated DAS early in the season, in fact the measure is designed to have the opposite effect. The fishery should be effectively regulated throughout the season to spread effort and avoid the common pool sub-ACL being reached too early in the year.

8.1.2 Other M-SFCMA requirements

Section 303 (a) of FCMA contains 14 required provisions for FMPs. These are discussed below. It should be emphasized that the requirement is imposed on the FMP. In some cases noted below, the M-S Act requirements are met by information in the Northeast Multispecies FMP, as amended. Any fishery management plan that is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the National Standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

Foreign fishing is not allowed under this management plan or this action and so specific measures are not included that specify and control allowable foreign catch. The measures in this management plan are designed to prevent overfishing and rebuild overfished stocks. There are no international agreements that are germane to multispecies management (the U.S./Canada Resource Sharing Understanding, implemented through Amendment 13, is not considered an international agreement).

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

Amendment 16 included a thorough description of the multispecies fishery from 2001 through 2008, including the gears used, number of vessels, landings and revenues, and effort used in the fishery. This action provides a summary of that information and additional relevant information about the fishery in Section 5.6.3.

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

The present biological status of the fishery is described in Section 5.2.1. Likely future conditions of the resource are described in Section6.1.1.Impacts resulting from other measures in the management plan other than the specifications included here can be found in Amendment 16. The maximum sustainable yield for each stock in the fishery is defined in Amendment 16 and optimum yield for the fishery is defined in Amendment 9.

(4) assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

U.S. fishing vessels are capable of, and expected to, harvest the optimum yield from this fishery as specified in Amendment 16 and Framework 44. U.S. processors are also expected to process the harvest of U.S. fishing vessels. None of the optimum yield from this fishery can be made available to foreign fishing.

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

Current reporting requirements for this fishery have been in effect since 1994 and were originally specified in Amendment 5. They were slightly modified in Amendments 13 and 16, and VMS requirement were adopted in FW 42. The requirements include Vessel Trip Reports (VTRs) that are submitted by each fishing vessel. Dealers are also required to submit reports on the purchases of regulated groundfish from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

Provisions in accordance with this requirement were implemented in earlier actions, and continue with this action. For common pool vessels, the carry-over of a small number of DAS is allowed from one fishing year to the next. If a fisherman is unable to use all of his DAS because of weather or other conditions, this measure allows his available fishing time to be used in the subsequent fishing year. Sectors will also be allowed to carry forward a small amount of ACE into the next fishing year. This will help sectors react should adverse weather interfere with harvesting the entire ACE before the end of the year. Neither of these practices requires consultation with the Coast Guard.

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

Essential fish habitat was defined for Atlantic wolffish in Amendment 16, and for all stocks in an earlier action. A summary of the EFH can be found in Section 5.1.3.

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

Scientific and research needs are not required for a framework adjustment. Current research needs are identified in Amendment 16.

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on-- (A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Impacts of this framework on fishing communities directly affected by this action and adjacent areas can be found in Section 6.5.

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

Objective and measurable Status Determination Criteria for all species in the management plan are presented in Amendment 16. A full explanation of how the criteria were determined can be found in the GARM III (NEFSC 2008) and Data Poor Working Group documents (DPWG 2009).

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;

A Standardized Bycatch Reporting Methodology omnibus amendment was adopted by the Council in June 2007. That methodology applies to this framework. The measure allocating yellowtail flounder allocation to the scallop fishery is expected to reduce bycatch by requiring all bycatch to be landed. The GOM cod and pollock trip limits may increase bycatch, but are a selective means available to meet mortality targets and continue rebuilding plans.

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

This management plan does not include a catch and release recreational fishery management program and thus does not address this requirement.

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

As noted above, the description of the commercial, recreational, and charter fishing sectors was fully developed in Amendment 16, and is summarized in this document (Section 5.6.1).

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

This proposed action does not allocate harvest restrictions or stock benefits to the fishery. Such allocations were adopted in Amendment 16, while this action implements catch limits for all stocks within the existing allocation structure.

(15) Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

Annual Catch Limits specifications are adopted in this action. The ACL process was described in Amendment 16. Specifications were developed in a way to ensure that overfishing does not occur in accordance with Amendment 16 and all relevant laws.

8.1.3 EFH Assessment

This essential fish habitat (EFH) assessment is provided pursuant to 50 CFR 600.920(e) of the EFH Final Rule to initiate EFH consultation with the National Marine Fisheries Service.

8.1.3.1 Description of Action

The purpose of the Framework 44 (Northeast Multispecies FMP) Proposed Action is to implement specifications for the fishery and to adopt management measures that are necessary to achieve the fishing mortality targets required by Amendment 16.

In general, the activity described by this Proposed Action, fishing for groundfish species, occurs off the New England and Mid-Atlantic coasts within the U.S. EEZ. Thus, the range of this activity occurs across the designated EFH of all Council-managed species (see Amendment 11 to the Northeast Multispecies FMP for a list of species for which EFH was designated, the maps of the distribution of EFH, and descriptions of the characteristics that comprise the EFH). EFH designated for species managed under the Secretarial Highly Migratory Species FMPs are not affected by this action, nor is any EFH designated for species managed by the South Atlantic Council as all of the relevant species are pelagic and not directly affected by benthic habitat impacts.

The Proposed Action is described in 3.0. The Proposed Action includes the following general measures:

- Measures to implement ACL specifications for FY 2010-2012
- Commercial fishery effort control modification measures

A list of specific measures and a summary of the habitat impacts of the proposed measures is found in 6.2.1 and **Error! Reference source not found.**.

It is not possible at this time to assess some of the proposed measures (mortality objectives incidental Catch TACs, commercial fishing measures trip limits, special management programs DAS leasing and special management programs haddock separator trawl or other authorized gear performance incentives. Other proposed measures not mentioned above are not expected to affect EFH as they are either administrative in nature or are expected to have neutral or no habitat impacts.

8.1.3.2 Assessing the Potential Adverse Impacts

Refer to the Habitat Impacts of the Proposed Action (Section 6.2.1, and **Error! Reference source not found.**) for a tabular look at the summary impacts of the proposed measures. Nearly all measures are expected to have neutral impacts on habitat.

Measures with Potential Negative Effects on EFH

There are no measures with potential negative effects on EFH.

Measures with Potential Positive Effects on EFH

Table 111 – Expected Positive Habitat Impacts of Proposed Action Relative to No Action Alternative

Proposed Measure	Expected Relative Habitat Impacts	Rationale
Allocation of yellowtail flounder to the scallop and groundfish fisheries	+/0	May result in slightly less scallop dredge effort in FY 2011 – 2012 as compared to No Action, and slightly lower groundfish fishing effort. No significant impacts on EFH expected.

8.1.3.3 Minimizing or Mitigating Adverse Impacts

Section 6.2.1 (habitat impacts of Proposed Action) demonstrates that the overall habitat impacts of all the measures combined in this action have neutral impacts relative to the baseline habitat protections established under Amendment 13 to the Northeast Multispecies FMP. As such, additional measures to mitigate or minimize adverse effects of the multispecies fishery on EFH beyond those established under Amendment 13 are not necessary.

8.1.3.4 Conclusions

Because there are no 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 2.6;
- The alternatives that were considered are described in sections 3.0 (Proposed Action) and 4.0 (alternatives to the Proposed Action);
- The environmental impacts of the Proposed Action are described in section 6.0;
- The agencies and persons consulted on this action are listed in section 7.2.4.

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 2.1.
- Background and purpose are described in section 0.
- A summary of the document can be found in section 1.0.
- A brief description of the affected environment is in section 4.0.
- Cumulative impacts of the Proposed Action are described in section 6.7.
- A determination of significance is in section 7.2.2.
- A list of preparers is in section 7.2.3.
- The index is in section 8.3.

8.2.2 Finding of No Significant Impact (FONSI)

National Oceanic and Atmospheric Administration Order (NAO) 216-6 (revised May 20, 1999) provides nine criteria for determining the significance of the impacts of a final fishery management action. These criteria are discussed below:

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

<u>Response:</u> This action cannot be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action. Analysis of the proposed measures in section 6.1 indicates that fishing mortality on almost all groundfish stocks will decline as a result of the Proposed Action. Further, indications are that stock size for all stocks should increase between 2010 and 2012 as a result of the

measures, helping to keep these stocks on the rebuilding trajectories adopted by Amendments 13 and 16. None of the measures are expected to have a large impact on habitat that could threaten the sustainability of any target resource.

(2) *Can the Proposed Action reasonably be expected to jeopardize the sustainability of any non-target species?*

Response: This action cannot be reasonable expected to jeopardize the sustainability of any non-target species that may be affected by the action. The proposed measures will set relatively low ACLs and implement trip limits that should reduce interactions between groundfish fishing vessels and other species. There are no indications that groundfish fishing activity is currently jeopardizing the sustainability of non-target species.

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

Response: The Proposed Action cannot be reasonably expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identifies in the FMP. As discussed in section 7.1.3, the proposed measures are expected to have neutral to beneficial impacts on habitat since they include additional reductions in fishing effort.

(4) *Can the Proposed Action be reasonably expected to have a substantial adverse impact on public health or safety?*

Response: Nothing in the Proposed Action can be reasonable 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 this action. 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. This action also implements trip limits, which do not have safety implications and, unlike the differential DAS effort control measure that was considered but not adopted, do not raise concerns about causing effort to shift offshore. The Proposed Action, 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 Proposed Action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response: The Proposed Action cannot be reasonably expected to adversely affect endangered or threatened species. As discussed in section 6.3, these species are expected to benefit slightly from the reductions in fishing effort that are proposed by this action. Formal consultation under Section 7 of the ESA is has been reinitiated and is ongoing for the NE Multispecies FMP. NMFS has determined that continued operation of the FMP during the consultation period, as authorized by NMFS, will neither jeopardize the continued existence of endangered and threatened species, nor destroy or adversely modify designated critical habitat.

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

Response: The Proposed Action is not expected to have a substantial impact on biodiversity and/or ecosystem function with the affected area. The use of ACLs will tightly control catches of target and incidental regulated groundfish stocks. Catches of target and incidental catch species under this program will be consistent with the mortality targets of Amendment 16, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH and that the overall impact to EFH will be positive. 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 Proposed Action. The Proposed Action is designed to implement specifications to continue the groundfish rebuilding programs that were implemented as a result of Amendments 13 and 16 to the Northeast Multispecies FMP. As described in section 3.1.1, 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, as the impacts are expected to fall within the range of those resulting from Amendment 16. The action's potential social and economic impacts are also addressed in the environmental assessment (see sections 6.5 and 6.4, respectively) and more specifically in the Executive Order 12866 review (section 7.11.1) and the Initial Regulatory Impact Review (section 7.11.2).

NMFS has determined that despite the potential socio-economic impacts resulting from this action, there is no need to prepare an EIS. The purpose of NEPA is to protect the environment by requiring Federal agencies to consider the impacts of their Proposed Action on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." The EA for Framework 44 describes and analyzes the proposed measures and alternatives and concludes there will be no significant impacts to the natural and physical environment. While some fishermen, shore-side businesses and others may experience impacts to their livelihood, these impacts in and of themselves do not require the preparation of an EIS, as supported by NEPA's implementing regulations at 40 C.F.R. 1508.14. Consequently, because the EA demonstrates that the action's potential natural and physical impacts are not significant, the execution of a FONSI remains appropriate under criteria 7.

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

Response: The effects of the proposed measures on the quality of human environment are not expected to be highly controversial. The need to rebuild groundfish stocks is well-documented. While there has been some debate over how quickly to rebuild those stocks and the desired biomass for each stock, legal requirements established by the M-S Act render these discussions moot. These issues were also resolved with the adoption of Amendment 16, and this action does not modify those rebuilding plans.

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

Response: No, the Proposed Action cannot be reasonably expected to result in substantial impacts to unique areas or ecological critical areas. The only designated HAPC in the areas affected by this action is protected by an existing closed area that would not be affected by this action. In addition, vessel operations around the unique historical and cultural resources encompassed by the Stellwagen Bank

National Marine Sanctuary would not likely be altered by this action. As a result, no substantial impacts are expected from this action.

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

Response: The Proposed Action is not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The effort control measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks and initiated stock rebuilding. The specifications were anticipated by Amendment 16 and results of the GARM III. The implementation of catch limits at levels set to take into account scientific and management uncertainty decrease the likelihood that overfishing will occur. 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 6.4 illustrates the distribution of results that are expected rather then provide only a point estimate. The greatest uncertainty associated with the analyses is the number of permits that will belong with sectors when this action is implemented. The analyses address several scenarios for membership, and since ultimately the availability of a choice of whether to join a sector will serve to mitigate social and economic impacts, this uncertainty cannot be seen as a significant source of risk. Notwithstanding such uncertainty, both the sectors and common pool components of the fishery will be subject to management measures that the analysis indicates will be effective in controlling fishing effort. Overall, the impacts of the Proposed Action can be, and are, described with a relative amount of certainty.

(11) *Is the Proposed Action 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, and Amendment 16. FW 42 developed specific measures implementing programs adopted by Amendment 13 (including some extended or renewed by this action); 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. The measures in this action were anticipated by Amendment 16 and thus cannot be said to have different cumulative impacts that were not foreseen and addressed in the amendment. Therefore, the Proposed Action, when assessed in conjunction with the framework actions noted above, would not have significant impacts on the natural or physical environment.

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

Response: The Proposed Action is not likely to affect objects listed in the National Register of Historic Places or cause significant impact to scientific, cultural, or historical resources. The only object in the fishery area that is listed in the National Register of Historic Places is the wreck of the steamship *Portland* within the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Proposed Action would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near the wreck to avoid tangling gear on the wreck. Therefore, this action would not result in any adverse affects to the wreck of the *Portland*.

(13) *Can the Proposed Action 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) *Is the Proposed Action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

Response: No, the Proposed Action is not likely to establish precedent for future actions with significant effects. The Proposed Action adopts specifications and other measures that are designed to react to the necessity to reduce fishing mortality for several groundfish stocks in order to achieve the fishing mortality targets adopted by Amendment 16. As such, these measures are designed to address a specific problem and are not intended to represent a decision about future management actions that may adopt different measures.

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

Response: The Proposed Action is 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. In fact, this action was developed in order to implement several new requirements of the law.

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

Response: As specified in the responses to the first two criteria of this section, the proposed action is not expected to result in cumulative adverse effects that would have a substantial effect on target or non-target species. This action would reduce fishing mortality for several groundfish stocks, with indirect reduction in mortality for non-target and non-groundfish stocks.

APPLICABLE LAW
National Environmental Policy Act (NEPA)

FONSI STATEMENT: In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Framework Adjustment 44 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 44 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.

Harold C Mears   3/15/2010

Northeast Regional Administrator, NOAA   Date

8.2.3 List of Preparers; Point of Contact

Questions concerning this document may be addressed to:

Mr. Paul Howard, Executive Director
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950
(978) 465-0492

This document was prepared by:

Jennifer Anderson, Northeast Region, National Marine Fisheries Service (NERO)
Amy Van Atten, Northeast Fisheries Science Center (NEFSC)
Talia Bigelow, New England Fishery Management Council (NEFMC)
Michelle Bachman, NEFMC
Deirdre Boelke, NEFMC
Daniel Caless, NERO
Douglas Christel, NERO
Steven Correia, Massachusetts Division of Marine Fisheries (MA DMF)
Patricia Fiorelli, NERO
Mark Grant, NERO
Dr. Demet Haksever, NEFMC
Anne Hawkins, (NEFMC)
Susan Murphy, NERO
Thomas Nies, NEFMC (plan coordinator)
Loretta O'Brien, NEFSC
Dr. David Potter, NEFSC
Dr. Eric Thunberg, NEFSC
David Twomey, NERO
Thomas Warren, NERO
Kurt Wilhelm, NERO

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 Proposed Action was developed during the period September 2009 through November 2009 and was discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

NEFMC Council	Radisson Hotel, Plymouth MA	9/23/2009
Groundfish PDT	Holiday Inn, Mansfield MA	10/29/2009
Groundfish Oversight	Sheraton Ferncroft, Danvers MA	11/5/2009
NEFMC Council	Hyatt Goat Island, Newport RI	11/18/2009

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 44.

For further information on the potential impacts of the fishery and the proposed management action on listed species, see section 6.3 of this document.

8.4 Marine Mammal Protection Act

The NEFMC has reviewed the impacts of the Proposed Action 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 6.3 of this document.

8.5 Coastal Zone Management Act

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to Section 930.36(c) of the regulations implementing the Coastal Zone Management Act, NMFS made a general consistency determination that the Northeast Multispecies Fishery Management Plan (FMP), including Amendment 16, and Framework Adjustment 44, 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.

8.6 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedures 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 Proposed Action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the Proposed Action is included so that intended users may have a full understanding of the Proposed Action and its implications.

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

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 Groundfish Assessment Review Meeting III (GARM III; NEFSC 2008) and the Northeast Data Poor Stocks Working Group (DPWG 2009), which both 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 Proposed Action were conducted using information from the most recent complete calendar years, through 2008, and in some cases includes information that was collected during the first nine months of calendar year 2009. Complete data were not available for calendar year 2009. 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 sections 3.0 and 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 6.0 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

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

8.8 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 44. 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 44 continues 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 7.11 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 a not “significant regulatory action” because it will not affect in a material way the economy or a sector of the economy.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may:

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The following discussion is limited to a determination of significance of the proposed action based solely on economic criteria. The proposed action contains three components. First, ACLs for all stocks are specified consistent with Amendment 16 requirements. Second, effective in 2011 a sub-ACL of yellowtail flounder will be made to the commercial scallop fishery. Last, this action would make adjustments to the commercial fishery effort control measures. Note that this action would also set FY2010 TACs for the US/Canada resource sharing understanding. However, since these TACs are subsumed in the setting of the overall ACLs the impacts of the US/CA TACs are not discussed separately herein. A more detailed treatment of the economic impacts of these individual measures is provided in Section 6.4.1. The following summarizes these findings and provides an estimate of annual economic impact for the proposed action as a whole.

8.11.1.1 Summary of Impacts on Fishing Revenue

ACL Specifications – The propose action would set ACLs for each groundfish stock consistent with Amendment 16 procedures. Assuming the combined ACLs could, in fact, be landed the potential revenue during 2010 was estimated to be nearly $190 million increasing to $196 million in 2012. Given the mixed species nature of the groundfish fishery and the need to achieve conservation objectives for all stocks it is unlikely that realized revenues would this high. Indeed, recent experience suggests the opposite. Neither of the two original sectors have ever harvested their full allocation of GB cod; the combined common pool and sector vessels have never harvested the available GB haddock or redfish; and catches of many other stocks have been less than the target TACs in recent years. Depending on discard rates and the extent to which sectors are able to adjust fishing practices the estimated potential groundfish revenue in 2010 ranges from $63.0 million to $87.2 million or more. Thus, compared to groundfish revenues during 2007 and 2008 of $85 million potential revenues during 2010 could equal or exceed recent levels of groundfish revenue. Potential revenues during 2011 and 2012 are expected to increase in each year ranging from $69.2 million to $96.1 million during 2011 and from $70.2 million to $97.4 million during 2012.

Yellowtail Flounder Allocation to the Scallop Fishery – This action would adopt a sub-ACL for SNE/MA and GB yellowtail flounder for the scallop fishery effective in FY2011. The sub-ACL would be set at 90% of the expected yellowtail flounder bycatch in the scallop fishery. Creating the sub-ACL creates an opportunity to assert management control over more sources of yellowtail flounder fishing mortality, but in order to do so must reduce the ACL allocated to the commercial groundfish fishery. Furthermore, allocating only 90% of the expected catch to the scallop fishery creates the possibility that an accountability measure will be triggered that could result in revenue losses in the scallop fishery. The economic impacts of this action are uncertain (see Section 7.4.1.1.1.1) since the accountability measure for the scallop fishery has yet to be decided, and given lower ACLs may provide incentives to change fishing practices in both the scallop and groundfish fisheries that would reduce yellowtail flounder catch rates mitigating the effects of lowering the ACL. However, assuming an in-season AM is selected for the scallop fishery and no change in fishing practices the potential loss in scallop revenue could be $35 million during 2011 and $36 million during 2012. Since the scallop fishery sub-ACL would require a deduction in the commercial groundfish ACL there would be potential revenue losses in the groundfish fishery as well. These revenue losses were estimated to be approximately $2.6 million during 2011 and $4.0 million during 2012.

Modification of Trip Limits – The proposed action would modify the effort control measures proposed under A16. Specifically, the GOM cod trip limit would remain at current levels and a pollock trip limit would be set at 1,000 pounds per DAS up to a maximum of 10,000 pounds. These changes affect the expected impact of the fishing conditions that common pool vessels will fish under during FY2010. The effects of the A16 effort control measures as modified by the proposed action were estimated by comparing fishing trips revenues during FY2007 to revenues that may be expected to be realized if these trips were taken during FY2010. That analysis found that fishing revenues may decline by about $5 million or which $2.9 million would be reduced revenue from groundfish and the remainder would be forgone revenues from other species that are typically landed while fishing for groundfish. This estimate may be offset by DAS leasing, however, the number of DAS allocated to the common pool as a whole are less than what may be needed.

Combined Economic Impacts – The proposed action would affect the groundfish fishery during FY2010-FY2012 and would affect the scallop fishery during FY2011 and FY2012. Note that the proposed action is limited to a 3-year time frame because all ACLs may be adjusted every other year according to Amendment 16 scheduling. During 2010 reductions in common pool revenues were estimated to be $5 million. Based on an estimate of $85 million in groundfish revenues during FY2008 the impacts from the setting of groundfish ACLs ranged from $63 million to $87 million; an impact ranging from a reduction of $22 million to a potential increase of $2 million. Adding these changes in potential revenue to the estimated common pool impacts results in a range estimate of $27 to $3 million in lost fishing revenue during 2010.

During FY 2011 an ACL will be set for yellowtail flounder in the scallop fishery in addition to the ACLs established for groundfish. Since at least a portion of the commercial ACL will be allocated to the common pool as these ACLs increase the potential revenue available to the common pool will also increase. For this reason potential common pool revenues will be assumed to be subsumed in the setting of ACLs. During 2011 the ACL set for yellowtail flounder was estimated to result in a combined loss of $38 million of which $35 million would be a reduction in scallop revenues. The potential estimated revenue from groundfish ACLs ranged from $69.2 million to $96.1 million. Thus, once again using 2008 groundfish revenue as a basis for comparison, the economic impacts during FY 2011 range between reductions of $53.8 million and $26.9 million in combined fishing revenue. During FY2012, impacts associated with the yellowtail flounder ACL were estimated to be $40 million in combined scallop and groundfish revenue. Estimated potential revenue from the FY 2012 commercial groundfish ACL ranged between $70.2 million and $97.4 million. Once again using 2008 groundfish revenue as a basis for comparison, the economic impacts during FY2012 range between a reduction in combined fishing revenue of $54.8 million to $27.6 million.

As noted previously, the estimates of impacts particularly that of the impact on the scallop fishery of setting a yellowtail flounder sub-ACL and the potential revenues for ACL specifications are uncertain. Given changes in groundfish management providing greater incentives to fish more selectively suggests that potential groundfish revenues could be substantially higher than estimated. Similarly, the yellowtail flounder sub-ACL may provide the incentive for scallop vessels to reduce yellowtail founder bycatch which would also reduce forgone scallop revenue. Nevertheless, in spite of the likelihood that the economic impacts of these proposed measures may be overestimated the quantified impacts were no more than $55.8 million in any year. Therefore, the estimated economic impacts of the Proposed Action are not expected to exceed $100 million on an annual basis.

8.11.1.2 Determination of Significance

The Proposed Action would have an adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses. The total quantified impact on the National or regional economy was not expected to exceed $55.8 million on an annual basis. This impact may be offset by adaptations to the Proposed Action or by increased sector membership. Further, economic impacts are expected to be lessened over time with increasing ACLs as groundfish stocks rebuild. The estimated economic impacts are will not exceed the $100 million threshold and thus the Proposed Action is not determined to be significant under the Executive Order.

8.11.2 Regulatory Flexibility Act

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

The proposed action would set ACLs for groundfish stocks for 2010, 2011, and 2012, set a sub-ACL for yellowtail flounder for the scallop fishery effective in 2011, and modify the common pool effort control measures for 2010. These measures would affect regulated entities engaged in commercial fishing for scallops and groundfish. Sub-ACLs will also be set for the recreational catches of GOM cod and GOM haddock and would affect regulated entities engaged in the party/charter industry. The size standard for commercial fishing (NAICS code 114111) is $4 million in sales while the size standard for party/charter operators (part of NAICS code 487210) is $7 million. Although multiple vessels may be owned by a single owner available tracking of ownership is not readily available to reliably ascertain affiliated entities. Therefore, for purposes of analysis each permitted vessel is treated as a single small entity.

During FY 2008 (the most recent complete fishing year) 2,732 vessels were issued a scallop and/or a groundfish permit. Of these vessels 1,867 were issued only a groundfish permit, 500 were only issued a scallop permit and 365 were issued both a scallop and a groundfish permit. Note that the latter include vessels that have a limited access scallop and a limited access Category E groundfish permit as well as vessels that hold some combination of a party/charter permit and a limited access scallop permit or a general category permit. Among groundfish permit holders 1,472 held a limited access permit and 760 held an open access party/charter permit.

Based on FY 2008 activity there were 1,267 of the 2,732 vessels with either a commercial scallop or groundfish permit that participated in the scallop or groundfish fishery. Median gross sales for these vessels were $186 thousand and sales by any no one entity did not exceed $4 million. Based on FY2008 logbook data there were 143 of the 760 permitted party/charter vessels that participated in the GOM recreational groundfish fishery where either GOM haddock or GOM cod were retained. The total number of passengers carried by any one of these regulated party/charter operators did not exceed 11,000. At an average passenger fee of approximately $65 per passenger none of the participating party/charter businesses would exceed $7 million in sales. Therefore, all 1,410 of the participating commercial and recreational for- hire vessels are considered small regulated entities under the RFA.

8.11.2.1 Economic Impacts of the Proposed Action

A more detailed treatment of economic impacts may be found in Section 7.4. As note in Section 7.4 and emphasized herein the economic impacts of the ACLs set for the commercial groundfish fishery are uncertain and indeterminate for any given vessel since the economic impacts depend on whether the vessel owner chooses to enroll in a sector or remain in the common pool. Sectors offer relief from certain regulations while being limited to a quota on catch. The former provides opportunities to improve economic efficiency while the latter places a premium on managing available quota for multiple species to maximize the value of catch. This will likely require changes in fishing practices including where, when, and how fishing operations are conducted. Groundfish revenues during both 2007 and 2008 were approximately $85 million. Given 2010 ACLs, at 2008 prices the available potential revenue would be $190 million assuming no discarding and the available ACL for all stocks can be harvested. Realizing revenues of this magnitude is unlikely since some level of discarding is likely and available ACL for some species may constrain the ability to harvest the full ACL of others. If no changes are made in discarding or selectivity, groundfish revenues may be expected to decline to $63 million. However, improvements in selectivity particularly while fishing for GB haddock which comprises nearly half of the aggregate groundfish ACL could lead to substantially higher revenues. If, for example, selectivity could be improved by 50% over 2007-2008 averages groundfish revenues would be an estimated $87 million.

Even if fishing revenues do not improve vessel owners that enroll in sectors may still find themselves in a more favorable financial position since sectors offer the opportunity for pooling of quota across fishing platforms. For individuals that own multiple vessels this allows them to shed redundant capital thereby reducing fixed costs. Operating costs may also be reduced since fishing will likely be moved to an owner’s most efficient vessel and through regulatory exemptions granted to each sector.

Economic impacts on vessels that do not enroll in a sector are uncertain although the common pool measures have been designed to stay within the combined ACL that will be allocated to the common pool as a whole. The economic impact of these measures was estimated by applying the common pool measures adopted under A16 as modified by this proposed action to FY2007 activity. As of September 1, there were 723 permits that had enrolled in a sector and 757 that had not. The latter includes a large number of vessels that have not been active in the groundfish fishery. In fact, only 279 of the common pool vessels had any Category A DAS that would enable them to participate in the groundfish fishery. Of these 279, only 113 were found to have participated in the groundfish fishery. These vessels had aggregate gross sales of $24.8 million (an average of $219.5 thousand per vessel) of which nearly 30% was derived from sales on trips where groundfish were landed. The combined effect of the A16/FW44 measures was estimated to reduce total sales by $5.1 million or an average of $45.1 thousand per vessel or 20.1%. These economic impacts may be offset by DAS leasing. However, converting 2007 activity into 24-hour increments, the total DAS needed to fish at 2007 levels (3,769 DAS) exceeds that of the total DAS that will be allocated to the common pool (3,600). The ability to find trading partners may also be limited by the restrictions on trading among vessels within specified baseline length and horsepower characteristics.

The economic impact of the yellowtail flounder sub-ACL that will become effective in 2011 is uncertain. This sub-ACL would have a potential impact on both groundfish and scallop vessels. However, as was the case for the setting groundfish ACLs the impact is indeterminate on any given vessel since the AM for the scallop fleet has yet to be determined and setting an ACL may engender changes in fishing strategies to avoid foregone revenues that may be associated with exceeding the ACL. Assuming an in-season AM is selected and no change in fishing patterns by either groundfish or scallop vessels, an upper bound estimate is a loss of $35 million and $2.6 million in scallop and groundfish revenue respectively, during 2011 and $36 million and $4 million during 2012. These values represent about 6% of the likely scallop ACLs that will be set for 2011 and 2012 and about 5% or less of groundfish revenue depending on factors noted above affecting realized groundfish revenue.

The economic impact of specification of the U.S./Canada TACs are difficult to predict due to the many factors that may affect the level of catch, however it is likely that due to the substantially reduced FY 2010 TACs for Eastern GB cod and GB yellowtail flounder (compared to FY 2009), the Proposed Alternative would result in reduced overall revenue from the U.S./Canada Management Area. The amount of fish landed and sold will not be equal to the sum of the TACs, but will be reduced as a result of discards, and may be further reduced by limitations on access to stocks that may result from the associated fishing rules. Reductions to the value of the fish may result from fishing derby behavior and potential impact on markets. The revenue from the sale of the three transboundary stocks may be up to 22% less than such revenue in FY 2008. It is possible that total revenue may be reduced by up to 30 percent from 2009 revenues. It should be noted that the amount of haddock that has been harvested from the U.S./Canada Area has been increasing, but it is unknown whether this trend will continue.

The proposed action would provide the Regional Administrator authority to implement trip limits or differential DAS counting in-season in order to prevent ACLs from being exceeded or to facilitate the harvesting of ACLs. Because this authority may result in either less or more fishing effort, it may either result in short term increases or decreases in revenue. The Regional Administrator authority would contribute to long term increases in revenue by optimizing catch levels to align with catch targets and facilitate stock rebuilding.

The proposed action makes no changes to the recreational measures that would be implemented as part of Amendment 16. Those measures would add two weeks to the GOM cod closed season and would reduce the size limit on GOM haddock from 19 to 18-inches. This means that passenger demand may be expected to respond to these regulatory changes and may not be expected to be affected by the setting of any particular recreational sub-ACL. However, since exceeding a recreational sub-ACL would trigger an AM the economic impacts on recreational party/charter vessels would be associated with the likelihood that harvest levels would trigger an AM.

According to GARM III estimates of landings, GOM cod harvest by all recreation modes ranged between 1,960 mt and 953 mt during 2004 to 2007. The GOM cod recreational sub-ACL will be 2,673 mt, 2,824 mt, and 2,826 mt during 2010, 2011, and 2012 respectively. Since harvest levels of GOM cod by the recreational sector including party/charter operators has been below the recreational sub-ACL for GOM cod an AM would not be expected to be triggered. For this reason the GOM cod sub-ACL is would not expected to have an economic impact on party/charter vessels. By contrast, recreational harvest of GOM haddock ranged between 430 mt and 717 mt during 2004-2007 whereas the recreational sub-ACL for GOM haddock will be declining from 324 mt during 2010 to 259 mt during 2012. This means that the recreational GOM haddock ACL will be about 57% of the average 2004-2007 average harvest. In the absence of avoidance behavior the GOM haddock sub-ACL may be expected to be exceeded triggering an AM. The impact of triggering a GOM haddock AM on party/charter vessels is uncertain. Available data suggest substitutability between cod and haddock on party/charter trips so the fact that the GOM cod recreational sub-ACL may not be constraining, some switching between haddock and cod on GOM party/charter trips may be anticipated. The economic impact on party/charter operators will depend on the selected AM and the relative strength of angler preference between cod and haddock. If the AM is a seasonal closure then the economic impact would be a loss in trips that could be taken during the closure. These trips may not be recovered given the seasonal nature of recreational passenger demand. If the GOM haddock AM is a change in the bag or size limit and cod may easily be substituted for haddock then passenger demand may be expected to be largely unchanged and the economic impact on party/charter vessels may be relatively low.

8.11.2.2 Economic Impact of Alternatives to the Proposed Action

Under the No Action Alternative, although ACLs would be specified, there would be no allocation made to the scallop fishery, and no U.S./Canada TACs would be specified. Under the No Action Alternative, the common pool management measure would be the same as those proposed by Amendment 16, and the Regional Administrator would not have additional authority to implement in-season trip limits or differential DAS requirements in order to prevent ACLs from being exceeded.

Because under the No Action Alternative the ACL is higher than that set by the Proposed Action, potential groundfish fishery revenues would also be higher. Also as a result of not making a yellowtail flounder allocation to the scallop fishery would not impact scallop revenues in FY 2010 because the scallop ACL sub-component would not constrain the scallop fishery in FY 2010. No allocation of yellowtail to the scallop fishery in FY 2010 would however result in additional revenue for the groundfish fishery (the revenue associated with 110 mt and 111 mt of GB and SNE/MA yellowtail flounder, respectively). Under the No Action Alternative, no specification of the U.S./Canada TACs would result in increased revenue from the U.S./Canada Area in the short term, but would undermine rebuilding of GB cod and yellowtail flounder, and would likely result in long term reductions in revenue.

As a result of not making a yellowtail flounder allocation in FY 2011 and 2012, scallop and groundfish fishing revenues would likely be higher than anticipated under the Proposed Action. If an allocation is not made then the scallop catches would not be constrained by yellowtail flounder. In FY 2011 and 2012, the overall limit on yellowtail flounder catch may reduce scallop fishery revenues by $ 35 million and $ 36 million, respectively. With respect to groundfish revenue, the upper bounds for the difference between the No Action Alternative and the Proposed Alternative for FYs 2011 and 2012 are $ 2.6 million and $ 4 million, respectively. Not specifying the U.S./Canada TACs could result in increased revenues for groundfish fishermen, however, not specifying TACs is likely to increase the risk of overfishing the transboundary stocks and long-term declines in landings and revenues.

The No Action Alternative would neither implement more restrictive trip limits for GOM cod and pollock, nor provide the Regional Administrator the authority to implement in-season effort controls (trip limits or differential DAS counting). As such the economic impacts of the No Action Alternative would not differ from those described in Amendment 16. There is the possibility that under the No Action Alternative there would be a lower likelihood of derby fisheries occurring and increased ability for vessel owners to plan, than under the Proposed Alternative and therefore greater economic stability, due to the fact that in-season changes to the regulations would not occur (except in the U.S./Canada Management Area).

9.0 REFERENCES

9.1 Glossary

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect: Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation: A group of animals or plants occurring together in a particular location or region.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anaerobic sediment: Sediment characterized by the absence of free oxygen.

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Annual Catch Entitlement (ACE): Pounds of available catch that can be harvested by a particular sector. Based on the total PSC for the permits that join the sector.

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship S=1-A.

ASPIC (A Surplus Production Model Incorporating Covariates): A non-equilibrium surplus production model developed by Prager (1995). ASPIC was frequently used by the Overfishing Definition Panel to define B_{MSY} and F_{MSY} reference points. The model output was also used to estimate rebuilding timeframes for the Amendment 9 control rules.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g, within the sand or mud found on the bottom. See *Benthic infauna*, below)

Benthic infauna: See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g, coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1^+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

B_{MSY}: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

$B_{threshold}$: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B_{target} as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, $B_{threshold}$ is often defined as either $1/2B_{MSY}$ or 1/4 B_{MSY}. $B_{threshold}$ is also known as $B_{minimum}$.

B_{target}: A desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1^+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3^+ biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (B_{MSY} or proxy) as a management objective. The biomass threshold ($B_{threshold}$ or B_{min}) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.

Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See *Epifauna*. Animals living upon the bottom that extend a certain distance above the surface.

Epifauna: See *Benthic infauna*. *Epifauna* are animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Exploitation pattern: Describes the fishing mortality at age as a proportion of fully recruited F (full vulnerability to the fishery). Ages that are fully vulnerable experience 100% of the fully recruited F and are termed fully recruited. Ages that are only partially vulnerable experience a fraction of the fully recruited F and are termed partially recruited. Ages that are not vulnerable to the fishery (including discards) experience no mortality and are considered pre-recruits. Also known as the partial recruitment pattern, partial recruitment vector or fishery selectivity.

Exploitation rate (u): The fraction of fish in the exploitable population killed during the year by fishing. This is an annual rate compared to F, which is an instantaneous rate. For example, if a population has 1,000,000 fish large enough to be caught and 550,000 are caught (landed and discarded) then the exploitation rate is 55%.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

$F_{0.1}$: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

F_{MAX}: a fishing mortality rate that maximizes yield per recruit. F_{MAX} is less conservative than $F_{0.1}$.

F_{MSY}: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

$F_{threshold}$: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses F_{MSY} or F_{MSY} proxy for $F_{threshold.}$ 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Furrow: A trench in the earth made by a plow; something that resembles the track of a plow, as a marked narrow depression; a groove with raised edges.

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Growth overfishing: Fishing at an exploitation rate or at an age at entry that reduces potential yields from a cohort but does not reduce reproductive output (see recruitment overfishing).

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with *structure-forming organisms*, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush-like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Immobile epifaunal species: See *epifauna*. Animals living on the surface of the bottom substrate that, for the most part, remain in one place.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Land runoff: The part of precipitation, snowmelt, or irrigation water that reaches streams (and thence the sea) by flowing over the ground, or the portion of rain or snow that does not percolate into the ground and is discharged into streams instead.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Lethrinids: Fish of the genus *Lethrinus*, commonly called emperors or nor'west snapper, are found mainly in Australia's northern tropical waters. Distinctive features of Lethrinids include thick lips, robust canine teeth at the front of the jaws, molar-like teeth at the side of the jaws and cheeks without scales. Lethrinids are carnivorous bottom-feeding fish with large, strong jaws.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See *Benthic community* and *Benthic infauna*. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A_{50} is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1^+ mean biomass; mean biomass summed across ages 3 and over is 3^+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L_{25} is the length where 25% of the fish encountered are retained by the mesh. L_{50} is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See *Commensalism*. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See *Polychaetes*. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Planktivore: An animal that feeds on plankton.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Porosity: The amount of free space in a volume of a material; e.g. the space that is filled by water between sediment particles in a cubic centimeter of seabed sediment.

Possession-limit-only permit: an open-access permit (see above) that restricts the amount of multispecies a vessel may retain (currently 500 pounds of "regulated species").

Potential Sector Contribution (PSC): The percentage of the available catch a limited access permit is entitled to after joining a sector. Based on landings history as defined in Amendment 16. The sum of the PSC's in a sector is multiplied by the groundfish sub-ACL to get the ACE for the sector.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Recovery time: The period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. "Recruitment" also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation: an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Retrospective pattern: A pattern of systematic over-estimation or underestimation of terminal year estimates of stock size, biomass or fishing mortality compared to that estimate for that same year when it occurs in pre-terminal years.

Riverine area: The area of a river and its banks.

Saurids: Fish of the family Scomberesocidae, the sauries or needlefishes. Distribution: tropical and temperate waters.

Scavenging species: An animal that consumes dead organic material.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedentary: See *Motile* and *Mobile organisms*. Not moving. Organisms that spend the majority of their lives in one place.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See *adult stage*. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be "highly" or "moderately" vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats*.

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). B_{MSY} is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, F_{MSY}, B_{MSY}, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Total mortality: The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Trophic guild: Trophic is defined as the feeding level within a system that an organism occupies; e.g., predator, herbivore. A guild is defined as a group of species that exploit the same class of environmental resources in a similar way. The trophic guild is a utilitarian concept covering both structure and organization that exists between the structural categories of trophic groups and species.

Turbidity: Relative water clarity; a measurement of the extent to which light passing through water is reduced due to suspended materials.

Two-bin (displacement) model: a model used to estimate the effects of area closures. This model assumes that effort from the closed areas (first bin) is displaced to the open areas (second bin). The total effort in the system is then applied to the landings-per-unit-effort (LPUE) in open areas to obtain a projected catch. The percent reduction in catch is calculated as a net result.

Vulnerability: In order to evaluate the potential adverse effects of fishing on EFH, the vulnerability of each species EFH was determined. This analysis defines vulnerability as the likelihood that the functional value of EFH would be adversely affected as a result of fishing with different gear types. A number of criteria were considered in the evaluation of the vulnerability of EFH for each life stage including factors like the function of habitat for shelter, food and/or reproduction.

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., Z = F+M)

Zooplankton: See *Phytoplankton*. Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

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9.3 Index

Addendum

to
Framework Adjustment 44

to the

Northeast Multispecies Fishery Management Plan

and its

Environmental Assessment

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1.0 Introduction

Framework Adjustment 44 (FW 44) to the Northeast Multispecies Fishery Management Plan (FMP) was adopted by the New England Fishery Management Council (NEFMC) on November 18, 2009. The final document was submitted to the National Marine Fisheries Service for review on January 15, 2010. The Proposed Action addressed two needs: to set specifications for ACLs in Fishing Years 2010-2012, and to modify management measures in order to ensure that overfishing does not occur. One **purpose** of the framework adjustment was to establish specifications for the Northeast multispecies fishery during the 2010-2012 fishing years. As part of the Proposed Action to address this purpose, Annual Catch Limits (ACLs) were specified for all groundfish stocks in the management unit. In some cases, these ACLs were distributed to different components of the fishery such as catches from state waters, recreational and commercial catch, or catches from various fisheries.

In the case of two stocks – Georges Bank and Southern New England/Mid-Atlantic yellowtail flounder – FW 44 made an allocation between the groundfish and scallop fisheries. These allocations were based on the amount of yellowtail flounder the scallop fishery was expected to harvest under a management program that targeted a specific fishing mortality (F=0.20) that was adopted in Scallop Framework Adjustment 21. On January 27, 2010, the NEFMC revisited its earlier scallop decision and chose a scallop management program based on a higher fishing mortality rate (F=0.24). As a result of this decision, the Council also increased the amount of yellowtail flounder allocated to the scallop fishery and decreased the amount of yellowtail flounder allocated to the groundfish fishery. This addendum modifies the FW 44 Proposed Action and adds the analyses needed to support these changes. Only information specific to the allocation of these two stocks to the two fisheries is included in this addendum to the FW 44 Environmental Assessment.

Unless otherwise noted, the initial FW 44 Environmental Assessment prepared for this action and attached to this addendum remains applicable, including the purpose and need for this framework. Sections addressed in this addendum should be considered within the context of the full FW 44 Environmental Assessment.

2.0 Proposed Action

2.1 Yellowtail Flounder Allocations for the Scallop Fishery

Amendment 16 adopts ACLs for groundfish stocks. Some of these ACLs are divided into either sub-ACLs that are subject to accountability measures (AMs), or other sub-components that are not subject to AMs. The amendment proposes that a portion of yellowtail flounder will be allocated to the scallop fishery. In FY 2010, the allocation is considered a sub-component, while in FY 2011 and beyond it will be considered a sub-

ACL subject to AMs that will be adopted in Scallop Amendment 15. The values for FY 2011 and FY 2012 may be revised in the future based on updated scallop and yellowtail flounder stock information, TMGC recommendations, and on future scallop fishery access area measures.

An estimate of the yellowtail flounder that will be caught by the scallop fishery in FY 2010 – FY 2012 if it harvests its projected yield was developed for four scallop management scenarios. In FY 2010, the scallop fishery will be assumed to catch 100 percent of the GB and SNE/MA yellowtail flounder projected to be caught if the scallop yield is harvested. In FY 2011 and FY 2012, the GB and SNE/MA yellowtail founder that will be allocated to the fishery in those years is 90 percent of this amount. For CC/GOM yellowtail flounder, scallop fishery incidental catches are low enough that they will be considered part of the "other sub-component". These catches will be monitored but a specific allocation will not be made in this action. An allocation may be made in the future.

Allocations are adjusted for management uncertainty when the allocation becomes a sub-ACL (in FY 2011 and beyond). As explained in Appendix III, for GB and CC/GOM yellowtail flounder (if/when specified) the sub-ACL will be set at 97 percent of the allocation, while for SNE/MA yellowtail flounder it will be set at 93 percent of the allocation.

The resulting values are shown in Table 1 for the scallop management scenario proposed in Scallop Framework Adjustment 21. Table 2 summarizes GB and SNE/MA yellowtail flounder specifications and reflects the changes to the amount of GB and SNE/MA yellowtail flounder allocated to the groundfish fishery. Table 3 reflects modified incidental catch TACs for special management programs.

Rationale: This alternative recognizes the importance of yellowtail flounder to the prosecution of the scallop fishery and allocates most of the yellowtail flounder that the fishery is expected to catch if it harvests the available scallop yield. It also creates an incentive for scallop fishermen to reduce bycatch of yellowtail flounder in order to maximize scallop yield. With respect to Cape Cod/Gulf of Maine yellowtail flounder, no allocation is made since the incidental catch is a low percentage of the available catch and can be accommodated by the "other sub-components" category. An allocation of this stock may be made in the future.

Table 1 – Proposed allocation of yellowtail flounder to the scallop fishery. Values are metric tons, live weight, rounded to the nearest metric ton. (1) This value is considered an "other sub-component in FY 2010 and is not a sub-ACL.

No Closure F = 0.24	*Total Expected to be Caught, YTF Stock Area*			*Scallop Fishery ABC*			*Sub-ACL*		
Year	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*	*CC*	*GB*	*SNEMA*
2010	39	146	135		146	135		146(1)	135(1)
2011	26	230	98		207	89		201	82
2012	32	352	151		317	136		307	127

Table 2 – Northeast Multispecies OFLs, ABCs, revised ACLs, and other ACL sub-components for FY 2010 – FY 2012 (metric tons, live weight) for GB and SNE/MA yellowtail flounder. Values are rounded to the nearest metric ton. Updated values are underlined in bold, italic type. Sector values are based on the September 1,2009 sector rosters and will change when final sector rosters are determined.

(1) YTF allocations for scallops are an other sub-component in FY 2010, but are expected to be sub-ACLs in FY 2011- 2012.
(2) Grayed out values may be adjusted as a result of future recommendations of the TMGC.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallops (1)	Groundfish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Yellowtail Flounder(2)	2010	5,148	1,200	0	60	***146***	***964***		0	***902***	***63***	0	***1,170***
	2011	6,083	1,081	0	54	***201***	***795***		0	***744***	***52***	0	***1,050***
	2012	7,094	1,226	0	61	***307***	***823***		0	***769***	***53***	0	***1,191***
SNE/MA Yellowtail Flounder	2010	1,553	493	5	20	***135***	***310***		0	***225***	***85***	0	***470***
	2011	2,174	687	7	27	***82***	***524***		0	***381***	***143***	0	***641***
	2012	3,166	1,003	10	40	***127***	***759***		0	***552***	***208***	0	***936***

Table 3 – Preliminary incidental catch TACs for Special Management Programs (metric tons, live weight). These values may change as a result of changes in sector membership.

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

3.0 Analysis of Impacts – Environmental Consequences

This section identifies the impacts of that part of the Proposed Action that allocates portions of two stocks of yellowtail flounder to the groundfish and scallop fisheries. It augments analyses in the FW 44 EA, but does not replace nor repeat the analyses of the No Action alternative or other measures.

3.1 Biological Impacts of the Proposed Action

3.1.1 Yellowtail Flounder Allocation to the Scallop Fishery

This measure allocates a portion of the yellowtail flounder ACL to the scallop fishery to account for incidental catches in that fishery. In FY 2010, the allocations to the scallop fishery are considered an "other sub-component" and are not subject to specific scallop fishery AMs. In subsequent years the allocation is considered a sub-ACL and the scallop FMP, through Amendment 15 (to be implemented in 2011) will adopt AMs to control these catches.

Allocations are proposed for two stocks - GB yellowtail flounder and SNE/MA yellowtail flounder. In FY 2010 the allocation is considered an "other sub-component" and as such is not subject to AMs. The allocation is 100 percent of the amount the scallop fishery is expected to harvest. This value was calculated by taking into account recent discard rates in the scallop fishery and projected changes in scallop and yellowtail flounder stock sizes. In FY 2011 and FY 2012, the allocations are sub-ACLs and are 90 percent of the amount the scallop fishery is expected to catch if they harvest the projected scallop yield. These amounts of yellowtail flounder were estimated by comparing recent discard rates, projected increases in scallop and yellowtail flounder abundance, and future scallop yields. The scallop fishery catch of CC/GOM yellowtail flounder is estimated to be a small amount and so a specific allocation is not made; catches are considered part of the "other sub-components."

In FY 2010, as mentioned, the yellowtail flounder allocations do not have specific AMs that control the overall yellowtail flounder catch. If the scallop fishery fishes in CAI, CAII, or the NLCA, it is limited to harvesting 10 percent of the ACL from within those areas, but there are no controls on the catch outside those areas. The Council discussed including measures in Amendment 5 to the Scallop Fishery that will "reach back" and adjust measures for the scallop fishery should it exceed its yellowtail flounder allocation, but measures have not been designed yet. Should the scallop fishery exceed the amount of yellowtail flounder that is allocated, then if the groundfish fishery harvests its allocation the total catch of yellowtail flounder could exceed the ACL. While the ACL is set well below the overfishing level (OFL) for both stocks and it is unlikely that total catches will approach this amount, rebuilding fishing mortality targets may not be met since the ACL is set closer to the ABC.

This result is less likely in subsequent years. While the exact scallop fishery AMs are still being developed, these AMs will create an incentive for scallop fishermen to control yellowtail flounder catches to avoid triggering the AMs. The result may be reduced catches of yellowtail flounder by the scallop fishery. Under No Action, there are no limits on the overall catch of GB and SNE/MA yellowtail flounder by the scallop fishery, increasing the risk total catches will exceed the overall ACL, particularly after FY 2010.

With respect to CC/GOM yellowtail flounder, this measure does not identify a specific allocation for the scallop fishery. The measure proposes that scallop fishery catches of this stock be considered part of the “other sub-components” part of the overall ACL. Scallop dredge discards as a percentage of the total catch from this stock have fluctuated during the period 2003 – 2007, in recent years, ranging from 0.6% to 5.6% percent (see Table 4). The amounts expected to be harvested by the scallop fishery are within this range. Other fisheries that may take small amounts of CC/GOM yellowtail flounder include state waters fisheries, the whiting fisheries, and the northern shrimp fishery. If scallop fishery catches remain low, then considering this catch part of an other sub-component does not risk mortality targets. As the scallop fishery catch increases, however, it becomes more likely that the total catch by these other fisheries may exceed the amount allocated to the other sub-component category. The likelihood of this occurring can be partially controlled by the selection of scallop management alternatives that minimize yellowtail flounder catches.

Table 4 – Recent scallop dredge catch of CC/GOM yellowtail flounder (Source: GARM III)

Year	Scallop Dredge Catch	Total Catch	Dredge Discards as Percentage of Total Catch
2003	25	1970	1.3%
2004	18	1186	1.5%
2005	6	997	0.6%
2006	11	620	1.8%
2007	35	627	5.6%

This option does not modify the amount of yellowtail flounder than can be taken inside the Georges Bank access areas. That amount is still limited to 10 percent of the ACL. The distribution proposed in this action will not have any impact on the amount of yellowtail flounder that can be taken by the scallop fishery within the CAI, CAII, and NLCA access areas. In this respect this Proposed Action does not differ from No Action. But where it differs from No Action is that it explicitly allows for yellowtail flounder catches in the scallop fishery when setting ACLs in all years, and in FY 2011 and beyond treats those catches as a sub-ACL subject to AMs. This increases that likelihood that yellowtail flounder catches will remain below levels required for ending overfishing and rebuilding overfished stocks when compared to No Action. While when compared to the action originally proposed in FW 44 this measure increases the amount of yellowtail flounder allocated to the scallop fishery and reduces the amount allocated to the groundfish fishery, the change in the overall ACL is only slightly different and there is no change in the risk of overfishing as a result.

Impacts on Non-Groundfish Stocks

The allocation of yellowtail flounder to the scallop fishery will have the most direct impacts on scallop stocks. If scallop fishermen cannot control the rate of incidental catches to the amount of yellowtail that is allocated, some scallop yield will be foregone. This could reduce fishing mortality on sea scallops. The extent that this occurs will depend not only on actual discard rates, but on what AMs are in place for the scallop fishery in future years. Estimates are that the scallop fishery will forego approximately 2,200 mt of scallop yield (meat weight) in FY 2011 and 2,220 mt of scallop yield in FY 2012 when compared to No Action (since under No Action there are no overall limits on the yellowtail flounder that can be caught by this fishery). It is expected these reductions will likely occur in open areas rather than access areas.

There may also be impacts on other stocks caught in the sea scallop and groundfish fisheries. For example, if sea scallop fishing activity is reduced because of yellowtail flounder incidental catches, catches of skates, monkfish, and other species caught by scallop fishermen may be reduced. Similar effects on a wider range of species may occur if the groundfish fishery loses effort as a result of allocating yellowtail flounder to the scallop fishery. Catches could be reduced of monkfish, skates, lobster, fluke, and other species caught by trawl fishermen. Since limits on GB and SNE/MA yellowtail flounder catch would not be in place under No Action, catches of other species could be higher.

3.2 Impacts to EFH of the Proposed Action

3.2.1 Yellowtail Flounder Allocation to the Scallop Fishery

The Proposed Action adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. For FY 2010 there is a negligible difference between this option and No Action when considering the scallop fleet. The allocation is 100 percent of the amount they are expected to harvest, so there are not likely to be any differences in the amount of scallop fishing effort in this year under either the No Action or Proposed Action alternatives. In FY 2011 and FY 2012, however, the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. When compared to No Action, this option may indirectly reduce scallop fishing effort in FY 2011 and beyond by a small amount and as a result slightly reduce the interaction of scallop dredge gear with EFH.

The same changes may take place in the groundfish fishery. For sector vessels, reduced access to yellowtail flounder may immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for EFH are likely to be positive but minor. This provision only the portion of the groundfish fleet that fishes for GB or SNE/MA yellowtail flounder and such fishing usually does not occur on complex, sensitive habitats.

3.3 Impacts on Endangered and Other Protected Species of the Proposed Action

The Proposed Action adopts a specific allocation of yellowtail flounder for the scallop and groundfish fisheries. For FY 2010 there is a negligible difference between this option and No Action when considering the scallop fleet. The allocation is 100 percent of the amount they are expected to harvest, so there are not likely to be any differences in the amount of scallop fishing effort in this year. This would likely mean that the impact to protected species would be negligible. In FY 2011 and FY 2012, however, the allocation may reduce scallop effort if the scallop fleet is unable to reduce incidental catches and loses access as a result. Such differences are likely to be minor, and if the scallop fishery further reduces incidental catch rates they may not occur. It is also possible that the fishery may be forced to reduce effort in one area but will respond by redirecting that effort to other areas. When compared to No Action, this option may indirectly reduce scallop fishing effort by a small amount and as a result slightly reduce the interaction of scallop dredge gear with protected species. More specifically, scallop dredges have been known to interact largely with sea turtles, therefore sea turtles are most likely to benefit from this action.

The same changes may take place in the groundfish fishery. For sector vessels, reduced access to yellowtail flounder may immediately constrain fishing activity and reduce fishing effort, while for common pool vessels the impacts may be delayed until an AM is triggered. In both cases the indirect impacts for protected species are likely to be positive but minor, as the possibility of interaction with the fishery decreases. This provision only affects a small portion of the groundfish fleet however the benefits have the possibility of being felt by a range of protected species.

3.4 Economic Impacts of the Proposed Action

3.4.1 Proposed Action – Yellowtail Flounder Allocation to Scallop Fishery

The allocation of yellowtail flounder between the scallop and groundfish fisheries may affect the fishing opportunities of the respective fleets. Determining the exact impact of the allocations is difficult because of the different management measures between the two fisheries. In particular, the AMs that apply to the fisheries shape the extent of the impacts. The Proposed Action bases the allocation to the scallop fleet of GB and SNE/MA yellowtail flounder on an estimate of the amount the fishery is expected to catch if it harvests its entire scallop yield. In FY 2010, the scallop fishery is assumed to harvest 100 percent of this estimated amount. In FY 2011 and FY 2012 the fishery is allocated 90 percent of this amount. No specific allocation is made for CC/GOM yellowtail flounder as the estimated scallop fishery catches are small enough to be included as part of the "other sub-component" allowance.

Elements of the groundfish fishery actively target yellowtail flounder, particularly in the GB stock area. The species is also caught while fishing for other stocks, particularly other flatfish. Under sector provisions, sector vessels can only fish in a stock area with gear that catches yellowtail flounder if they have Annual Catch Entitlement (ACE) remaining. Since sectors are subject to hard TACs, reducing the amount of yellowtail flounder available to the sectors may limit their opportunities to fish for other species. For vessels in the common pool the issue is more complex. Because common pool vessels are governed by effort controls and a differential DAS AM in FY 2010 and FY 2011, a reduction in yellowtail flounder available to this component does not necessarily result in an immediate loss of opportunities; but exceeding an ACL in the first year triggers the AM in the second year, so ultimately fishing opportunities are affected. In the U.S./Canada area the impacts are more immediate since the catch of GB yellowtail flounder is controlled by a hard TAC and by in-season AMs such as changes in trip limits, gear requirements, and the loss of access to the Eastern U.S./Canada area. Beginning in FY 2012 with the adoption of the hard TAC AM for common pool vessels, any change in yellowtail flounder allocations has immediate impacts on the common pool fleet.

For the scallop fishery, yellowtail flounder is an important incidental catch species. Since 2004, scallop fishery catches of yellowtail flounder have not showed clear trends even while yellowtail stocks rebuild (Table 5). As a portion of the total catch, their percentage has increased as the restrictions on the groundfish fleet reduced overall harvest. To date, the only limits on yellowtail flounder catch applicable to this fishery have been on the amount that can be harvested from within the CAI, CAII, and NLCA closed area access programs. Regulatory requirements establish this limit as 10 percent of the target TAC/ACL for the GB or SNE/MA stocks. The scallop management measures, however, compensate scallop vessel with trips in open areas if an access area is closed due to yellowtail flounder catches. With the adoption of an allocation and AMs applicable to the scallop fishery the possibility exists that the amount of yellowtail flounder available to this fishery could limit access to scallops in all areas. In FY 2010, this allocation is treated as an "other sub-component" of the yellowtail flounder ACL and there are no scallop fishery AMs should it be exceeded. In FY 2011 and beyond, there will be AMs for the scallop fishery (adopted through Amendment 15). The exact nature of those AMs is still under development and it is not clear how they will impact scallop vessels.

The relative value of yellowtail flounder to the two fisheries was calculated, but the characterization of this value as a loss or gain to either fishery is complicated by the different management measures just described. For the scallop fishery, future discard rates were calculated based on past observed discard rates in open and access areas and future changes in yellowtail flounder and scallop biomass. These rates were applied to the expected scallop yield under four different scallop management scenarios to estimate the yellowtail flounder the fishery would be expected to harvest absent other limits. This “expected” or “needed” yellowtail flounder was then reduced by ten percent in FY 2011 and FY 2012 as proposed by this action. The entire reduction was assumed to be taken from open areas, and open area catch was reduced accordingly. The differences in revenues were then calculated between the expected yellowtail flounder catch and the reduced yellowtail flounder catch. While initially the calculations were done for four different scallop management scenarios, the results shown here apply to the scallop management scenario adopted by the Council in January, 2010, and are based on a the targeted scallop fishing mortality of 0.24.

The results of these calculations are shown in Table 8 through Table 9. Each metric ton of yellowtail flounder is more valuable to the scallop fishery in areas with lower discard rates because more scallops are landed for each metric ton allocated. Because of higher discard rates on GB – particularly in the CAII access area – the lowest values of yellowtail flounder are in this area. Overall, allocating 90 percent of the expected yellowtail flounder catch in GB and SNE/MA may reduce scallop vessels revenues by about $35 million in FY 2011 – FY 2012 when compared to No Action (where revenues are not limited by an overall yellowtail flounder cap). This ranges from 6% to 7% of forecast scallop revenues. In FY 2010 there aren’t expected to be any revenue changes realized by the scallop fishery since there is no specific allocation and no specific measures that limit overall scallop fishing if the yellowtail flounder allocation is exceeded. The Council may consider a measure in Scallop Amendment 15 that adjusts FY 2011 or FY 2012 allocations if the scallop fishery exceeds the amount estimated for FY 2010, but that measure has not yet been designed.

A similar analysis was performed for the groundfish fishery for the GB and SNE/MA yellowtail flounder stocks. In both stocks areas two calculations were developed. The first is a straightforward estimate of the value of each metric ton of yellowtail flounder based on 2007 and 2008 data. The second calculation determined the total value of all species landed on groundfish trips in the area, and then determined the value of this total per metric ton of yellowtail flounder landed. This high value is most appropriate for those vessels in sectors or for FY 2012 when the hard TAC AM affects common pool vessels, since it shows the loss of all revenue if yellowtail flounder leads to a complete loss of access to a stock area. On Georges Bank this was further refined for common pool vessels by taking into account discard rates and the different management measures in the Eastern and Western U.S./Canada areas. Since the Eastern Area closes if the yellowtail flounder TAC is exceeded, all revenues were sacrificed from this area, while fishing continues in the Western Area. This provides a third, or expected, value per metric ton. In the SNE/MA area, only trips that landed yellowtail flounder were considered in the analysis. These values were multiplied by the allocations under consideration to determine the revenue reductions for the groundfish fishery under the proposed allocation and the three scallop management scenarios under consideration.

Results are summarized in Table 11 and Table 11. The value of each metric ton of yellowtail flounder to the groundfish fishery ranges from a low of $3,296 to a high of $41,176. GB yellowtail flounder is more valuable than SNE/MA yellowtail flounder because of the increased groundfish fishing opportunities on GB. The estimated losses to the fishery range from a low of $481,216 to a high of $13 million over the next three years. To put these values in context, FY 2005 to FY 2007 groundfish revenues averaged $101 million and total revenues on groundfish trips averaged $158 million (see NEFMC 2009), but Amendment 16 may reduce groundfish revenues by 15% and total revenues by 18%. The changes estimated here thus fall in the range of less than one percent to 15.3% of groundfish revenues, and less than one percent to 10% of total revenues on groundfish trips.

All of these estimates assume no changes in fishing behavior by either fishery. In both cases changes in fishing practices could mitigate potential revenue losses. For example, if the ratio of yellowtail flounder caught to scallops landed can be decreased through either gear modifications or fishing practices, then the scallop fishery will harvest more of its available yield prior to triggering any AMs that may be adopted for FY 2011 and beyond. If the groundfish fishery can do the same – reducing the yellowtail flounder caught while fishing for other species – the same result can be expected and revenue losses would not be as large as estimated here. There is evidence in observed groundfish fishing trips that this may be possible, at least for roundfish species.

Compared to the No Action alternative, the Proposed Action is likely to reduce scallop fishery revenues. Under No Action, no specific allocation is made to the scallop fishery and thus the scallop yield should approach that estimated for the adopted scallop management scenario. For the groundfish fishery the differences between this option and No Action are less certain. If an allocation is not made to the scallop fishery, then the overall yellowtail ACL would serve as the trigger for groundfish AMs. Since the scallop fishery presumably would still catch yellowtail flounder without any limit, it is possible that excessive yellowtail flounder catches would result in groundfish AMs and lost fishing opportunities for this fleet. But when compared to No Action when any losses are not realized until an AM is triggered, under the Proposed Action there is an immediate loss of groundfish revenues as a result of allocating yellowtail flounder to the scallop fishery.

Table 5 – Scallop fishery yellowtail flounder catches, CY 2004-2008

	Fishing Year	2004	2005	2006	2007	2008
CC/GOM	Total TAC	881	1233	650	1078	1406
	Total TAC for scallop fishery*	86.3	120.8	63.7	105.6	137.8
	Scallop AA open or closed	N/A	N/A	N/A	N/A	N/A
	Total YT catch by dredge gear (landings and discards)	18	6	12	35	5
	Total YT Catch (all gear)	1186	997	620	627	727
	Scallop catch as percent of total catch	1.5%	0.6%	1.9%	5.6%	0.7%
SNE	Total TAC	707	1982	146	213	312
	Total TAC for scallop fishery*	69	194	14	21	31
	Scallop AA open or closed	open	closed	open	open	open
	Total YT catch by dredge gear (landings and discards)	125	130	168	188	151
	Total YT Catch (all gear)	614	367	369	396	504
	Scallop catch as percent of total catch	20.3%	35.4%	45.5%	47.5%	29.9%
GB	Total TAC	6000	4260	2070	900	1869
	Total TAC for scallop fishery*	588	417	203	88	183
	Scallop AA open or closed	open	open	open	open	closed
	Total YT catch by dredge gear (landings and discards)	84	194	254	122	134
	Total YT Catch (all gear, U.S. only)	6386	3637	1573	1564	1118
	Scallop catch as percent of total catch	1.3%	5.3%	16.1%	7.8%	12.0%

Table 6 – Summary of YT needed by scallop fishery in 2010-2012 in MT and % of total YTF ABC

		total YT needed (mt)			% YT needed		
No Closure - F=0.24		**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
	CC	39	26	32	4.5%	2.5%	6.5%
	GB	146	230	352	12.2%	21.3%	28.7%
	SNE	135	99	152	11.6%	8.1%	15.2%

Table 7 – Yellowtail flounder allocated to the scallop fishery under the Proposed Action. Not reduced for management uncertainty. Note the action does not make a specific allocation for CC/GOM yellowtail flounder. Not reduced for management uncertainty.

	YTF Allocated, By Stock Area and Scallop Management Scenario		
	CC	GB	SNEMA
NC, F=0.24			
2010	*39*	146	135
2011	*23.4*	207	89
2012	*28.8*	317	136

Table 8 – Change in scallop fishery revenues per mt of yellowtail flounder allocated, by year, YTF stock area and scallop management scenarios. Assumes allocation is 90 percent of expected harvest.

Year/ Scenario	**Change in Revenue/mt YTF, Dollars**			**Change as Percent of Revenues from YTF Stock Area**		
	CC	GB	SNE/MA	CC	GB	SNEMA
NC, F=0.24						
2010						
2011	$3,317,598	$109,586	$3,297,153	3.8%	0.2%	1.2%
2012	$3,535,475	$252,160	$1,727,238	3.1%	0.3%	0.7%

Table 9 – Change in scallop revenues if YTF allocation is 90 percent of amount expected to be harvested for GB and SNE/MA stocks, and no specific allocation for CC/GOM YTF stock

Scallop Scenario	**Year** 2010	2011	2012
NCF=.24		$35,030,399	$35,043,322
	As Percent of Total Scallop Revenues		
NCF=.24		7%	6%

Table 10 – Change in revenues on groundfish trips per mt of YTF; average of 2007 and 2008. For GB, expected revenues consider difference in management measures for common pool vessels between EGB and WGB.

	GB	SNE/MA
YTF Revenues/mt	$3,296	$3,895
Total Revenues/mt	$41,176	$28,708
Expected Revenues/mt	$12,674	

Table 11 – Reduction in groundfish revenues from GB and SNE/MA YTF stock areas Proposed Action allocation of yellowtail flounder to the scallop fishery. These values represent the difference between potential groundfish revenues if there is no scallop fishery catch of yellowtail flounder and the proposed allocation. Based on 2007/2008 revenues.

	Georges Bank			SNE/MA	
	Low	**High**	**Expected**	**Low**	**High**
NC, F=0.24					
2010	$481,216	$6,011,696	$1,850,404	$525,825	$3,875,580
2011	$682,272	$8,523,432	$2,623,518	$343,539	$2,532,046
2012	$1,044,173	$13,044,557	$4,015,123	$529,331	$3,901,417

3.5 Social Impacts of the Proposed Action

3.5.1 Proposed Action - Yellowtail Flounder Allocation to the Scallop Fishery

This measure allocates a portion of the yellowtail flounder ACL to the scallop fishery to account for incidental catches in that fishery. In FY 2010, the allocations to the scallop fishery are considered an “other sub-component” and are not subject to specific scallop fishery AMs. In subsequent years the allocation is considered a sub-ACL and the scallop FMP will adopt AMs to control these catches. Also, scallop vessels are required to land all yellowtail flounder that is caught. The measure may distribute the catches differently than has been done in the past, which may have some social impacts on both fleets.

Allocations are proposed for two stocks - GB yellowtail flounder and SNE/MA yellowtail flounder – and are based on 100 percent of the amount the scallop fishery is expected to catch if they harvest the projected scallop yield in FY 2010, and 90 percent of the amount in FY 2011 and FY 2012. These amounts of yellowtail flounder were estimated by comparing recent discard rates, projected increases in scallop and yellowtail flounder abundance, and future scallop yields. The scallop fishery catch of CC/GOM yellowtail flounder is estimated to be less than five percent of the ABC and so a specific allocation is not made; catches are considered part of the “other sub-components.”

In addition to specific concerns about catch levels and rebuilding timelines, when compared to No Action any measure that shifts allocation from one fishery to another may have impacts on some of the other social impact categories. *Changes in occupational opportunities* could occur if the allocation provides more opportunities in either fleet: if the scallop fishery is seen as advantaged from the allocation, then effort could shift into that fishery. *Formation of attitudes* could clearly be affected if constituents of either fishery feel disadvantaged by the measure with respect to the other fishery.

3.6 Impacts on Other Fisheries

The primary other fishery affected by this measure is the scallop fishery. This fishery is directly affected by the amount of yellowtail flounder that is allocated to it. These impacts are described in the above sections.

3.7 Cumulative Effects Analysis

The cumulative effects of all measures in FW 44, including this allocation, are described in section 7.7 of the framework document.

4.0 Applicable Law

Minor modifications to the Applicable Law Section are necessary as a result of a change in the scallop management action.

4.1 Regulatory Impact Review

The portions of the Regulatory Impact Review that are related to the allocation of yellowtail flounder to the scallop fishery are updated in the following sections. For additional information, see the FW 44 document.

4.1.1 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." See FW 44 for a further description of this review. Only the portions of that review that change as a result of the new scallop management action are discussed in the following sections.

4.1.1.1 Summary of Impacts on Fishing Revenue

Yellowtail Flounder Allocation to the Scallop Fishery – This action will allocate SNE/MA and GB yellowtail flounder to the scallop fishery. In FY 2010, this is an other sub-component and is not subject to scallop fishery AMs. It is set at 100 percent of the expected yellowtail flounder catch in the scallop fishery. In FY 2011 and beyond, this allocation is a sub-ACL. The sub-ACL would be set at 90% of the expected yellowtail flounder bycatch in the scallop fishery. Creating the sub-ACL creates an opportunity to assert management control over more sources of yellowtail flounder fishing mortality, but in order to do so must reduce the ACL allocated to the commercial groundfish fishery. Furthermore, allocating only 90% of the expected catch to the scallop fishery creates the possibility that an accountability measure will be triggered that could result in revenue losses in the scallop fishery. The economic impacts of this action are uncertain (see Section 7.4.1.1.1.1) since the accountability measure for the scallop fishery has yet to be decided, and given lower ACLs may provide incentives to change fishing practices in both the scallop and groundfish fisheries that would reduce yellowtail flounder catch rates mitigating the effects of lowering the ACL. However, assuming an in-season AM is selected for the scallop fishery and no change in fishing practices the potential loss in scallop revenue could be $35 million during 2011 and 2012. Since the scallop fishery sub-ACL would require a deduction in the commercial groundfish ACL there would be potential revenue losses in the groundfish fishery as well. These revenue losses were estimated to be between $3 million and $5.1 million during 2011 and between $4.5 million and $7.9 million during 2012 (see Table 11).

Combined Economic Impacts – The FW 44 document includes a summary of the combined economic impacts of all proposed measures, including the allocation of yellowtail flounder between the scallop and groundfish fisheries. That discussion remains applicable, as the differences between the two scallop management actions does not change the impacts enough to require revising the ranges shown in that section.

4.1.1.2 Determination of Significance

The Proposed Action would have an adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses. The total quantified impact on the National or regional economy was not expected to exceed $55.8 million on an annual basis. This impact may be offset by adaptations to the Proposed Action or by increased sector membership. Further, economic impacts are expected to be lessened over time with increasing ACLs as groundfish stocks rebuild. The estimated economic impacts will not exceed the $100 million threshold and thus the Proposed Action is not determined to be significant under the Executive Order.

4.1.2 Regulatory Flexibility Act

The purpose of the RFA is to reduce the impacts of burdensome regulations and recordkeeping requirements on small businesses. To achieve this goal, the RFA requires Federal agencies to describe and analyze the effects of proposed regulations, and possible alternatives, on small business entities. To this end, as a result of the change in the scallop management action, this document adds additional information to the IRFA in FW 44.

4.1.2.1 Economic Impacts of the Proposed Action

The economic impact of the yellowtail flounder sub-ACL that will become effective in 2011 is uncertain. This sub-ACL would have a potential impact on both groundfish and scallop vessels. However, as was the case for the setting groundfish ACLs the impact is indeterminate on any given vessel since the AM for the scallop fleet has yet to be determined and setting an ACL may engender changes in fishing strategies to avoid foregone revenues that may be associated with exceeding the ACL. Assuming an in-season AM is selected and no change in fishing patterns by either groundfish or scallop vessels, an upper bound estimate is a loss of $35 million and $5.1 million in scallop and groundfish revenue respectively during 2011 and $35 million and $7.0 million during 2012. These values represent about 6% of the likely scallop revenues that will be set for 2011 and 2012 and about 5-7% or less of groundfish revenue depending on factors noted above affecting realized groundfish revenue.

5.0 Appendix III Revisions

Appendix III documents the calculation of OFLs, ABCs, ACLs, and other sub-components. Included in the appendix are two tables that document the distribution of ABCs. These tables are reproduced here with the changes to GB yellowtail flounder and SNE/MA yellowtail flounder (highlighted in underlined, italic, bold type) that result from the change in the scallop management program. No other changes have been made. Sector values in this table are based on September 1, 2009 sector rosters and will change when final sector rosters are determined.

Table 12 – Distribution of ABC to fishery components.
(1) Includes commercial ABC in state waters and other subcomponents

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Cod	2010	4,812	1,012	3,800	0.01	0.04		0.95	0.95		0.949389974	
	2011	5,616	0	5,616	0.01	0.04		0.95	0.95		0.949389974	
	2012	6,214	0	6,214	0.01	0.04		0.95	0.95		0.949389974	
GOM Cod	2010	8,530	0	8,530	0.10	0.05		na	0.663	0.337	0.926205087	
	2011	9,012	0	9,012	0.10	0.05		na	0.663	0.337	0.926205087	
	2012	9,018	0	9,018	0.10	0.05		na	0.663	0.337	0.926205087	
GB Haddock	2010	62,515	17,612	44,903	0.01	0.04		0.95	0.95		0.972129238	0.002
	2011	46,784	0	46,784	0.01	0.04		0.95	0.95		0.972129238	0.002
	2012	39,846	0	39,846	0.01	0.04		0.95	0.95		0.972129238	0.002
GOM Haddock	2010	1,265		1,265	0.01	0.04		na	0.725	0.275	0.952531093	0.002
	2011	1,206		1,206	0.01	0.04		na	0.725	0.275	0.952531093	0.002
	2012	1,013		1,013	0.01	0.04		na	0.725	0.275	0.952531093	0.002
GB Yellowtail Flounder	2010	1,500	300	1,200	0.00	0.05	***0.122***	***0.828***	***0.828***		0.93516549	
	2011	1,689	608	1,081	0.00	0.05	***0.191***	***0.759***	***0.759***		0.93516549	
	2012	1,916	690	1,226	0.00	0.05	***0.258***	***0.692***	***0.692***		0.93516549	
SNE/MA Yellowtail Flounder	2010	493		493	0.01	0.04	***0.274***	***0.676***	***0.676***		0.726460172	
	2011	687		687	0.01	0.04	***0.129***	***0.821***	***0.821***		0.726460172	
	2012	1,003		1,003	0.01	0.04	***0.136***	***0.814***	***0.814***		0.726460172	
CC/GOM Yellowtail Flounder	2010	863		863	0.01	0.04		0.95	0.95		0.932830303	
	2011	1,041		1,041	0.01	0.04		0.95	0.95		0.932830303	
	2012	1,159		1,159	0.01	0.04		0.95	0.95		0.932830303	
Plaice	2010	3,156		3,156	0.01	0.04		0.95	0.95		0.935528195	
	2011	3,444		3,444	0.01	0.04		0.95	0.95		0.935528195	
	2012	3,632		3,632	0.01	0.04		0.95	0.95		0.935528195	
Witch Flounder	2010	944		944	0.01	0.04		0.95	0.95		0.950533446	
	2011	1,369		1,369	0.01	0.04		0.95	0.95		0.950533446	
	2012	1,639		1,639	0.01	0.04		0.95	0.95		0.950533446	

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Ground-fish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Winter Flounder	2010	2,052		2,052	0.00	0.05		0.95	0.95		0.970333537	
	2011	2,224		2,224	0.00	0.05		0.95	0.95		0.970333537	
	2012	2,543		2,543	0.00	0.05		0.95	0.95		0.970333537	
GOM Winter Flounder	2010	238		238	0.25	0.05		0.70	0.70		0.835133988	
	2011	238		238	0.25	0.05		0.70	0.70		0.835133988	
	2012	238		238	0.25	0.05		0.70	0.70		0.835133988	
SNE/MA Winter Flounder	2010	644		644	0.08	0.05		0.87	0.87			
	2011	897		897	0.08	0.05		0.87	0.87			
	2012	1,198		1,198	0.08	0.05		0.87	0.87			
Redfish	2010	7,586		7,586	0.01	0.04		0.95	0.95		0.965879893	
	2011	8,356		8,356	0.01	0.04		0.95	0.95		0.965879893	
	2012	9,224		9,224	0.01	0.04		0.95	0.95		0.965879893	
White Hake	2010	2,832		2,832	0.01	0.04		0.95	0.95		0.952587679	
	2011	3,295		3,295	0.01	0.04		0.95	0.95		0.952587679	
	2012	3,638		3,638	0.01	0.04		0.95	0.95		0.952587679	
Pollock	2010	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
	2011	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
	2012	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
N. Window-pane Flounder	2010	169		169	0.01	0.29		0.70	0.70			
	2011	169		169	0.01	0.29		0.70	0.70			
	2012	169		169	0.01	0.29		0.70	0.70			
S. Window-pane Flounder	2010	237		237	0.01	0.29		0.70	0.70			
	2011	237		237	0.01	0.29		0.70	0.70			
	2012	237		237	0.01	0.29		0.70	0.70			
Ocean Pout	2010	271		271	0.01	0.04		0.95	0.95			
	2011	271		271	0.01	0.04		0.95	0.95			
	2012	271		271	0.01	0.04		0.95	0.95			

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Secto r PSC	MWT
Atlantic Halibut	2010	71		71	0.50	0.05		0.45	0.45			
	2011	78		78	0.50	0.05		0.45	0.45			
	2012	85		85	0.50	0.05		0.45	0.45			
Atlantic Wolffish	2010	83		83	0.01	0.04		0.95	0.95			
	2011	83		83	0.01	0.04		0.95	0.95			
	2012	83		83	0.01	0.04		0.95	0.95			

Table 13 – Distribution of ABC to fishery components
(1) Includes commercial ABC in state waters and other sub-components

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	Non-Sector	MWT
GB Cod	2010	4,812	1,012	3,800	38	152	0	3,610	3,610	0	3,427	183	0
	2011	5,616	0	5,616	56	225	0	5,335	5,335	0	5,065	270	0
	2012	6,214	0	6,214	62	249	0	5,903	5,903	0	5,605	299	0
GOM Cod	2010	8,530	0	8,530	566	283	0	8,530	5,655(1)	2,875	4,452	355	0
	2011	9,012	0	9,012	597	299	0	9,012	5,975(1)	3,037	4,704	375	0
	2012	9,018	0	9,018	598	299	0	9,018	5,979(1)	3,039	4,707	375	0
GB Haddock	2010	62,515	17,612	44,903	449	1,796	0	42,568	42,568	0	41,382	1,186	90
	2011	46,784	0	46,784	468	1,871	0	44,351	44,351	0	43,115	1,236	94
	2012	39,846	0	39,846	398	1,594	0	37,774	37,774	0	36,721	1,053	80
GOM Haddock	2010	1,265		1,265	9	37	0	1,265	917(1)	348	828	41	3
	2011	1,206		1,206	9	35	0	1,206	874(1)	332	789	39	2
	2012	1,013		1,013	7	29	0	1,013	734(1)	279	663	33	2
GB Yellowtail Flounder	2010	1,500	300	1,200	0	60	***146***	***994***	***994***	0	***930***	***64***	0
	2011	1,689	608	1,081	0	54	***207***	***820***	***820***	0	***767***	***53***	0
	2012	1,916	690	1,226	0	61	***317***	***848***	***848***	0	***793***	***55***	0
SNE/MA Yellowtail Flounder	2010	493		493	5	20	***135***	***333***	***333***	0	***242***	***91***	0
	2011	687		687	7	27	***89***	***564***	***564***	0	***410***	***154***	0
	2012	1,003		1,003	10	40	***136***	***816***	***816***	0	***593***	***223***	0
CC/GOM Yellowtail Flounder	2010	863		863	9	35	0	820	820	0	765	55	0
	2011	1,041		1,041	10	42	0	989	989	0	923	66	0
	2012	1,159		1,159	12	46	0	1,101	1,101	0	1,027	74	0
Plaice	2010	3,156		3,156	32	126	0	2,998	2,998	0	2,805	193	0
	2011	3,444		3,444	34	138	0	3,272	3,272	0	3,061	211	0
	2012	3,632		3,632	36	145	0	3,450	3,450	0	3,228	222	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Witch Flounder	2010	944		944	9	38	0	897	897	0	852	44	0
	2011	1,369		1,369	14	55	0	1,301	1,301	0	1,236	64	0
	2012	1,639		1,639	16	66	0	1,557	1,557	0	1,480	77	0
GB Winter Flounder	2010	2,052		2,052	0	103	0	1,949	1,949	0	1,892	58	0
	2011	2,224		2,224	0	111	0	2,113	2,113	0	2,050	63	0
	2012	2,543		2,543	0	127	0	2,416	2,416	0	2,344	72	0
GOM Winter Flounder	2010	238		238	60	12	0	166	166	0	139	27	0
	2011	238		238	60	12	0	166	166	0	139	27	0
	2012	238		238	60	12	0	166	166	0	139	27	0
SNE/MA Winter Flounder	2010	644		644	53	32	0	559	559	0	0	559	0
	2011	897		897	72	45	0	780	780	0	0	780	0
	2012	1,198		1,198	96	60	0	1,042	1,042	0	0	1,042	0
Redfish	2010	7,586		7,586	76	303	0	7,207	7,207	0	6,961	246	0
	2011	8,356		8,356	84	334	0	7,938	7,938	0	7,667	271	0
	2012	9,224		9,224	92	369	0	8,763	8,763	0	8,464	299	0
White Hake	2010	2,832		2,832	28	113	0	2,690	2,690	0	2,563	128	0
	2011	3,295		3,295	33	132	0	3,130	3,130	0	2,982	148	0
	2012	3,638		3,638	36	146	0	3,456	3,456	0	3,292	164	0
Pollock	2010	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
	2011	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
	2012	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
N. Window-pane Flounder	2010	169		169	2	49	0	118	118	0	0	118	0
	2011	169		169	2	49	0	118	118	0	0	118	0
	2012	169		169	2	49	0	118	118	0	0	118	0
S. Window-pane Flounder	2010	237		237	2	69	0	166	166	0	0	166	0
	2011	237		237	2	69	0	166	166	0	0	166	0
	2012	237		237	2	69	0	166	166	0	0	166	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Ocean Pout	2010	271		271	3	11	0	257	257	0	0	257	0
	2011	271		271	3	11	0	257	257	0	0	257	0
	2012	271		271	3	11	0	257	257	0	0	257	0
Atlantic Halibut	2010	71		71	36	4	0	32	32	0	0	32	0
	2011	78		78	39	4	0	35	35	0	0	35	0
	2012	85		85	43	4	0	38	38	0	0	38	0
Atlantic Wolffish	2010	83		83	1	3	0	79	79	0	0	79	0
	2011	83		83	1	3	0	79	79	0	0	79	0
	2012	83		83	1	3	0	79	79	0	0	79	0

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Appendix I

SSC’s Recommendations on ABCs for the Northeast Multispecies Fishery

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

To: Paul J. Howard, Executive Director
From: Dr. Steve Cadrin, Chairman, Scientific and Statistical Committee
Date: September 23, 2009

Subject: Acceptable Biological Catch (ABC) Recommendations for the Northeast Multispecies Fishery

The Scientific and Statistical Committee (SSC) was asked to 1) review Groundfish Plan Development Team calculations of ABCs for groundfish stocks for fishing years 2010-2012 using the guidance previously provided by the SSC, and to 2) finalize Groundfish ABC recommendations to the Council. On August 10-11 2009, the SSC reviewed several sources of information and associated presentations by the Multispecies Plan Development Team (PDT):

1. Memo from Groundfish PDT to SSC, July 13, 2009
2. Memo from Paul Howard to SSC, June 23, 2009
3. Transboundary Resource Assessment Committee (TRAC) Status Report 2009/03 for Georges Bank Yellowtail Flounder
4. Addendum to Groundfish PDT Memo, August 7 2009

In May 2009, the SSC concluded that in the absence of better information on what an appropriate buffer should be between the OFL and the ABC, a relatively simple ABC specification could be applied to all groundfish stocks. In June 2009, the SSC recommended that the Council should consider an Acceptable Biological Catch (ABC) specification that uses the same method for all groundfish stocks, similar to guidelines for stocks that have not rebuilt at the end of the required building period:

1. *ABC should be determined as the catch associated with 75% of F_{MSY}.*
2. *If fishing at 75% of F_{MSY} does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements ($F_{rebuild}$).*
3. *For stocks that cannot rebuild to B_{MSY} in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).*
4. *Interim ABCs should be determined for stocks with unknown status according to case-by-case recommendations from the SSC.*

<u>Methods</u> - The PDT applied the SSC's recommendations to derive ABCs for groundfish stocks for fishing years 2010-2012. The SSC endorsed the stock assessments and projection methods from the most recent peer review as a basis for providing ABC recommendations. Projections methods from the 2008 Groundfish Assessment Review Meeting (GARM) were applied to all groundfish stocks, except Georges Bank yellowtail flounder (derived from the 2009 Transboundary Resources Assessment Committee, TRAC) and Atlantic wolfish (derived from the 2008 Northeast Data Poor Stocks Working Group, DPSWG). Estimates of 2008 abundance from the GARM were projected

assuming estimates of 2008 catch (observed landings plus discards, estimated from 2008 observer data) and estimates of 2009 fishing mortality from the evaluation of the 2009 interim action (except for Georges Bank haddock and Georges Bank yellowtail flounder, for which the 2009 total allowable catch was assumed).

Method 1: ABC based on 75%F_{MSY}:

- Three groundfish stocks are rebuilt (Georges Bank haddock, Gulf of Maine haddock and redfish), and ABC recommendations are based on projections that assume 75%F_{MSY} from 2010 to 2012.
- Six stocks are expected to rebuild within the required period if fishing mortality is limited to 75%F_{MSY} (Georges Bank cod, Gulf of Maine cod, Cape Cod-Gulf of Maine yellowtail flounder, American plaice, witch flounder, and Georges Bank winter flounder), and ABC recommendations are based on projections that assume 75%F_{MSY} from 2010 to 2012.
- Six stocks do not have accepted projection methods (pollock, northern windowpane, southern windowpane, ocean pout, Atlantic halibut and Atlantic wolfish), and ABC recommendations are based on the most recent estimate of stock biomass and 75%F_{MSY}.

Method 2: ABC based on $F_{rebuild}$:

Three stocks are not expected to rebuild within the required period at 75%F_{MSY} (Georges Bank yellowtail flounder, southern New England-Mid Atlantic yellowtail flounder, and white hake), and ABC recommendations are based on fishing at $F_{rebuild}$ during 2010 to 2012.

Method 3: ABC based on reduction in incidental bycatch:

Southern New England-Mid Atlantic winter flounder is not expected to rebuild within the required period, and the ABC recommendations are based on estimates of discards that result from recent management measures.

Method 4: Interim ABC based on data-poor proxies

Gulf of Maine winter flounder has unknown stock status, and the ABC recommendation is based on 75% of recent catches.

Technical Notes:

1. *Georges Bank Yellowtail Flounder* – The ABC recommendation for Georges Bank yellowtail flounder was based on the Council's stated objective of rebuilding the stock to B_{MSY} by 2014 with 75% probability. Alternative assessments from the 2009 TRAC provide different perspectives with respect to rebuilding status and 2010 catch advice. The assessment including recent Canadian survey data suggests that rebuilding can be achieved at a 2010 catch of 2,600t. The assessment excluding recent Canadian survey data suggests that rebuilding can be achieved at a 2010 catch of 450t. The SSC recommends that 2010 ABC should be 1,500t, which is an intermediate between the ABCs implied by the alternative models. The assessment including recent Canadian survey data suggests that a 2010 catch of 1,500t provides 86% probability of rebuilding by 2014, and the assessment excluding recent Canadian survey data suggests that a 2010 catch of 1,500t provides 61% probability of rebuilding by 2014. ABC recommendations for 2011 and 2012 will be re-considered by the SSC based on TRAC updates in 2010 and 2011. If the decision of the Transboundary Management Guidance Committee (TMGC) is inconsistent with the U.S. rebuilding objectives, and an intermediate perspective of the two assessment models, the ability of the Council to achieve U.S. management objectives for Georges Bank yellowtail flounder will be limited.

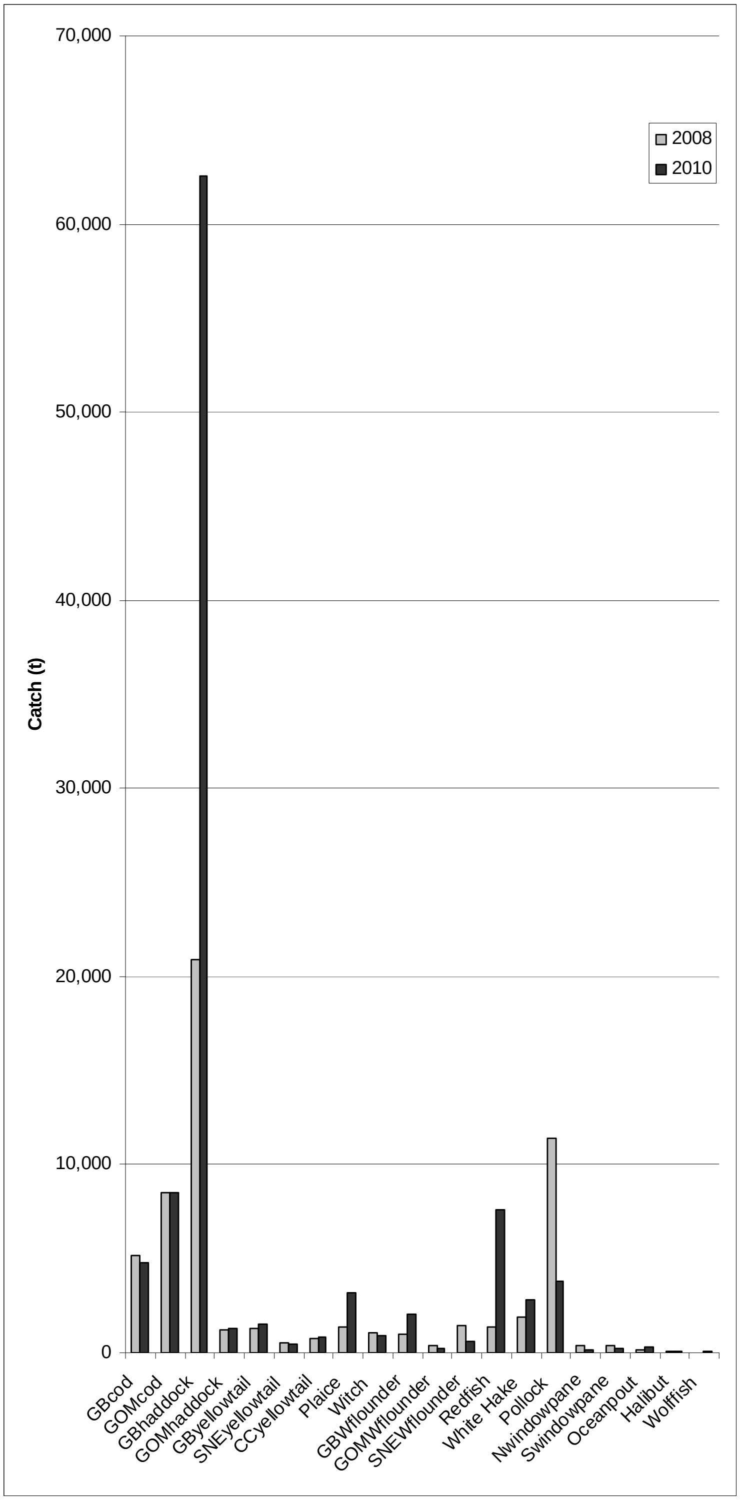
2. *Georges Bank Cod* – If the decision of the TMGC is inconsistent with the U.S. rebuilding objectives, the ability of the Council to achieve U.S. management objectives for Georges Bank cod will be limited.
3. *Pollock* – Projection methods for pollock were accepted by the GARM, but the 2008 catch removed from the most recent estimate of biomass implies projections of negative survey indices. Given the poor performance of the projection method, the ABC for pollock is based on 75%F_{MSY} and the most recent estimate of biomass (i.e., the average of 2006-2008 fall survey indices). The SSC recommends that pollock should be re-assessed as soon as possible to derive a more reliable basis for projection and catch advice.
4. *Wolffish* – The DPSWG did not determine a projection method to derive catch advice for wolfish. Alternative assumptions of selectivity and size at maturity provide a range of F_{MSY} and exploitable biomass estimates (e.g., F_{MSY} = 0.2 to 0.7 and exploitable biomass = 215 to 533 t). Based on the guidance from the DPSWG that F_{MSY} is most likely less than 0.35 and that survey-based estimates of size-at-maturity may not be reliable, the SSC recommends that ABC for 2010-12 be 83t, based on the assessment model that assumes steep selectivity and 75cm size at 50% maturity.
5. *Index-based Stock Assessments* - All index-based assessments should be reviewed in 2010 to determine if 2011 and 2012 ABC recommendations can be improved upon with Bigelow survey data and the calibration workshop results. If calibration coefficients are accepted by the workshop for use in stock assessment, updated survey indices can be used to derive revised ABC recommendations.

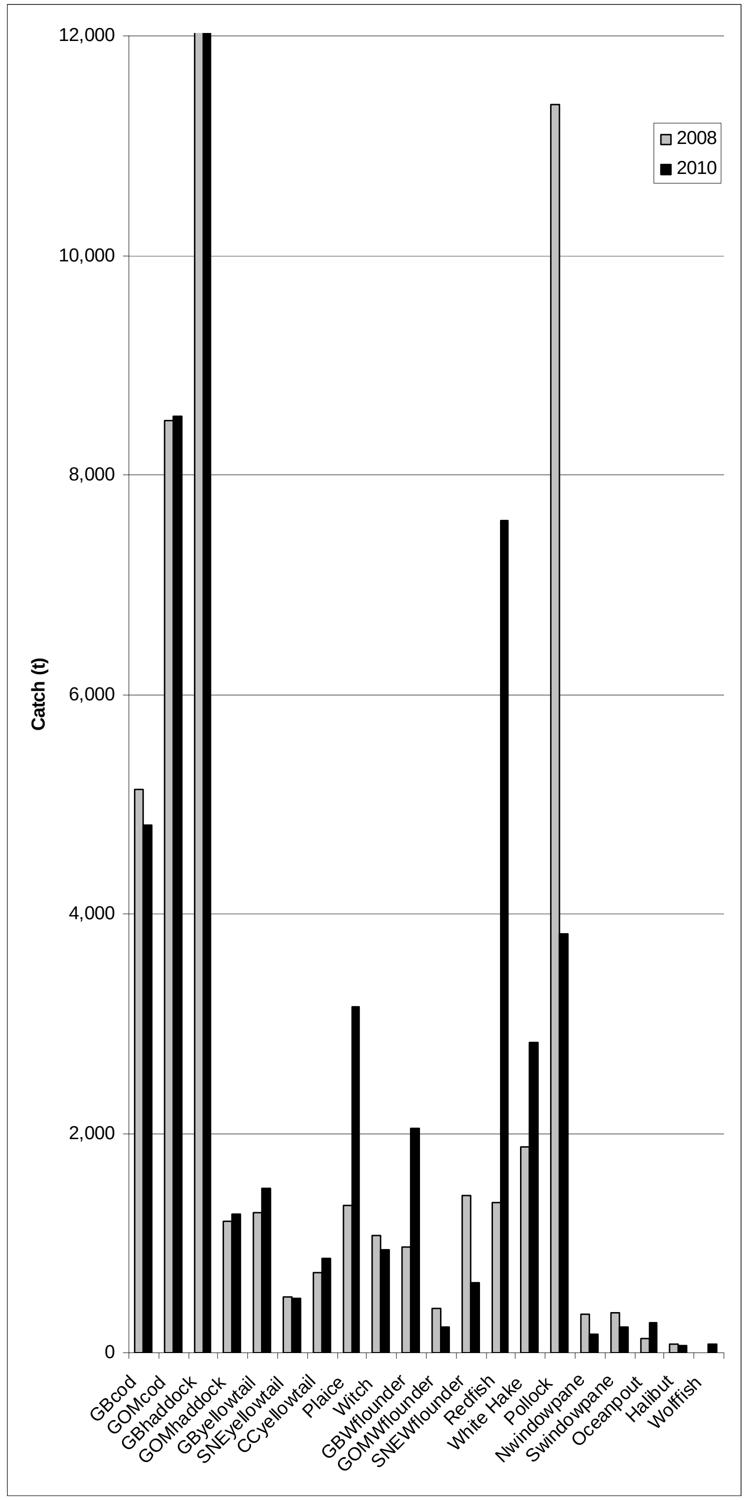
SSC Recommendations for Acceptable Biological Catch recommendations for the Northeast Multispecies Fishery (ABCs include all catch: U.S., Canada, recreational harvest, etc., as calculated in the most recent assessments).

Species	Stock	2008 Catch	2010 ABC	2011 ABC	2012 ABC
Cod	GB	5,134	4,812	5,616	6,214
Cod	GOM	8,499	8,530	9,012	9,018
Haddock	GB	20,901	62,515	46,784	39,846
Haddock	GOM	1,197	1,265	1,206	1,013
Yellowtail Flounder*	GB	1,276	1,500	1,689	1,916
Yellowtail Flounder	SNE/MA	504	493	687	1,003
Yellowtail Flounder	CC/GOM	727	863	1,041	1,159
American Plaice	GB/GOM	1,348	3,156	3,444	3,632
Witch Flounder		1,063	944	1,369	1,639
Winter Flounder	GB	963	2,052	2,224	2,543
Winter Flounder	GOM	402	238	238	238
Winter Flounder	SNE/MA	1,432	644	897	1,198
Redfish		1,364	7,586	8,356	9,224
White Hake	GB/GOM	1,876	2,832	3,295	3,638
Pollock*	GB/GOM	11,370	3,813	3,813	3,813
Windowpane*	GOM/GB	350	169	169	169
Windowpane*	SNE/MA	363	237	237	237
Ocean Pout*		125	271	271	271
Atlantic Halibut		84	71	78	85
Atlantic Wolffish			83	83	83

*ABCs for 2011 and 2012 for these stocks may be revisited based on updated assessments or survey indices.

Recommended ABCs for northeast multispecies stocks in 2010 and estimated catch in 2008 for comparison (catch of Georges Bank haddock extends beyond the scale of the right panel).





Appendix II

Groundfish Plan Development Team (PDT)

Development of Annual Catch Limits (ACLs)

for

2010 to 2012

I. Document Purpose:

Pursuant to Amendment 16, this PDT document describes pertinent information regarding the development of ACLs for the 2010 to 2012 specification period.

II. Background:

The ACLs were developed based upon the Science and Statistical Committee's (SSC) recommended Acceptable Biological Catch (ABC) for 2010 to 2012, and in accordance with the draft Amendment 16 "Administrative Process for Setting Multispecies ACLs". The focus of this discussion is the consideration of management uncertainty, but is built upon the recommendations of the SSC and the previous work of the PDT (August 7, 2009 Memorandum from PDT to SSC; July 13, 2009 Memorandum from PDT to SSC).

III. Abstract:

From the single recommended ABC values for each stock, ACLs were calculated in a two step process: (1) The division of the ABC into fishery components, and (2) downward adjustment of components to account for management uncertainty. The division of the ABC into subcomponents is based upon Amendment 16 allocation decisions, and percentages assigned by the PDT that reflect anticipated groundfish and non-groundfish fisheries (in order to categorize and account for all sources of fishing mortality). A working concept of management uncertainty was created to facilitate discussions, and qualitative elements with which to evaluate management uncertainty defined. A common default percentage reduction of the ABC subcomponent was set (5 %) to account for management uncertainty, and then particular stocks or stock/subcomponent combinations were identified that should have a higher or lower percentage reduction (based upon the defined elements of management uncertainty).

IV. Details:

Subdivision of ABC into subcomponents.

Amendment 16 contains the percentage splits of the ABC among fishery subcomponents (i.e. commercial and recreational), which are not intended to be subject to modification by the PDT. Other subdivisions of the ABC are recommendations of the PDT, made in conjunction with the development of ACLs, based upon pertinent fishery information and, in consultation with pertinent Council committees. For example, there may be calculations for Canada catch, state "off-the-top" subtraction, non-specified fisheries, herring fishery, scallop fishery, groundfish common pool, groundfish private recreational, groundfish charter/party, and U.S./Canada. Further information on the proposed subcomponents are in the September 14, 2009 memorandum from the PDT to the Groundfish Committee.

Create a simplified working concept of management uncertainty and identify qualitative elements of management uncertainty.

Management uncertainty is the likelihood that management measures will result in a level of catch ≥ catch objective. The *effectiveness* of management measures is a useful term that is related to management uncertainty (lower effectiveness of management measures results in greater management uncertainty, i.e., greater likelihood that measures will result in a catch that exceeds the catch level objective). The national standard guidelines state that two sources of management uncertainty should be accounted for: (1) Uncertainty in the ability of managers to constrain catch so the ACL is not exceeded; and (2) uncertainty in quantifying the true catch amounts (i.e., estimation errors). The purpose of setting an ACL(s) is to prevent catch from exceeding the ABC.

> The principal elements relating to management uncertainty that may be considered are the following:
>
> **Enforceability** - Can the management measures be effectively enforced at sea or on land through the use of uniform and unambiguous criteria that can be easily complied with by fishery participants?
> **Monitoring Adequacy -** Timeliness **–** Are all relevant data collected, recorded, and made available shortly after completion of fishing operations? Completeness **–** Is all information related to all aspects of fishing operations and relevant to management of the fishery (e.g., kept catch, discards, landings, species composition, amount/type/size of gear used, area fished, effort expended, etc.) collected and recorded? Accuracy **–** Does the information collected correctly reflect fishing operations (e.g., area fished, species and amounts kept/discarded, days-at-sea fished, etc.) or is verifiable and/or automated in order to minimize the possibility of data entry errors?]
> **Precision** - Can the management tools be used in a manner that will result in the desired amount of catch, or is there an inherent weakness or imprecision to the tool (complexity of FMP, no mechanism to slow or stop fishing effort, etc). Are there other factors that are pertinent to determining the effectiveness of management measures?
> **Latent Effort –** Is there excessive latent fishing effort in the FMP that could be reactivated and undermine effectiveness of FMP, or is the latent effort eliminated or controlled (e.g., Category C DAS)?
> **Other Fishery Catch –** Can the FMP regulate or limit catch of groundfish by other fisheries, including state, exempted, and recreational fisheries? Is the level of such catch highly variable, stable, or of a deminimus nature?

Set a default percentage reduction of the ABC to account for management uncertainty for most stocks, and identify relative uncertainty among stocks and stock/fishery components.

The PDT discussion focused on two aspects of accounting for management uncertainty: (1) Distinguishing relative amounts of management uncertainty between stocks, and stock/fishery component combinations, and (2) Determining the appropriate percentage adjustment of the ABC.

Distinguishing relative amounts of management uncertainty between stocks and stock/fishery component combinations:
This evaluation includes determining whether particular stock and fishery segment combination are associated with greater or lesser management uncertainty than others (e.g., sector GOM cod versus common pool GOM cod, versus private recreational vs party/charter). Most stocks and segments of the fishery will be categorized identically with respect to management uncertainty due to the common management measures applied to many stocks and/or a current lack of information to assign management uncertainty with more precision, and be assigned a standard percentage reduction from the ABC. If a particular stock or fishery segment may be subject to notable uncertainty, then an alternate adjustment from the ABC would apply to account for notable uncertainty (relatively high or low management uncertainty).

For this initial development of ACLs, for most stocks and stock/fishery component combinations it is difficult to predict whether there will be meaningful differences in management uncertainty among such components. Management measures for vessels fishing in either the common pool or sectors will be substantially different from the status quo management measures. Furthermore, the number of permits that will actually participate in sectors, and the number that will remain in the common pool, will not be known until just prior to the start of the fishing year. Amendment 16 analysis indicates that for most stocks, measures will achieve the desired fishing mortality goals. Due to the substantive changes in management measures in the future, analysis of historic performance of fishery management measures is of limited use for predicting future management uncertainty at this time.

In most cases there is no strong evidence that justifies a conclusion that different stocks or stock/fishery components have different management uncertainty. For example, evaluating whether the management uncertainty associated with the common pool versus sectors: Although there is the hypothesis that the sector management regime of Amendment 16 will result in the more effect control of catch (as well as more efficient fishing operations, approaching optimal yield, etc), that system will be new, and the level of management uncertainty associated with that system may not be substantively different from the common pool. The success of sectors will depend upon many novel fishing behaviors, organizations, monitoring systems etc. Not-withstanding the limitation of current data, the PDT did evaluate past catch information in order to glean insights into the fishery as a whole.

Comparisons were made between recent catches and target TACs (TTACs), using a calendar year basis since that is how mortality is calculated: since Amendment 13, 87 TTACs have been specified and 9 have been exceeded. Since the amendment was in effect for a full calendar year (e.g. since 2005), the SNE/MA yellowtail flounder TTAC was exceeded three times (2006, 2007, 2008), white hake was exceeded in 2008, and GB yellowtail flounder was exceeded in 2007. While these comparisons suggest the management system generally controlled catches, fishing mortality still exceeded targets, and measures were designed to achieve mortality targets, not to attain a particular catch. In addition to past management uncertainty (due to various elements of the FMP), scientific uncertainty also was relevant to historic catch levels. It is impossible to parse out the relative roles of scientific and management uncertainty in evaluating past catch levels. For that reason, comparisons of historic catch to TTAC are not particularly useful in providing guidance on estimating management uncertainty.

After various fishery-dependant data from the 2010 fishing year has been compiled and analyzed, it is more likely that evidence of differences in the elements of management uncertainty among components of the fishery could be used to further distinguish management uncertainty. It is anticipated that future ACL specification cycles may be able to better distinguish management certainty among stocks or stock/fishery components. Although it is conceivable that adjustments to ACLs prior to the next specification cycle may be desired, it may be difficult to make such adjustments due to the time required to analyze data and implement modified ACLs.

<u>Determining the appropriate percentage adjustment of the ABC</u>:
The amount of adjustment of the ABC was the second topic. One theoretical method discussed was to base the amount of adjustment down from ABC based upon the consequences of exceeding the ABC. Based upon a particular amount of catch in excess of the ABC, and the resultant impact on future catch levels, the ACL could be determined. This method was not pursued because it would have been based upon an assumed amount of overage for each stock. For the reasons discussed above, it is very difficult to determine the appropriate assumptions. A similar rationale for GB haddock was discussed that would have set management uncertainty to close to zero, based on the fact that it is highly unlikely that catch will approach ABC, given the stock size and multiple aspects of the FMP and fishery that will constrain haddock catch. It was concluded however that this approach, based on stock status and the nature of the fishery, was more of a risk assessment evaluation that would be difficult to apply across all stocks.

A third approach discussed briefly by the PDT was the use of a discard rate or observer coverage rate as a numerical basis upon which to derive management uncertainty, particular for sectors. This approach is rooted in the assumption that management uncertainty for sectors (fishing under hard TACs) will be closely related to the ability of managers to accurately monitor the fishery catch. Specifically, accurate monitoring will relate to both the amount of illegal and/or under-reported discards, and the level of observers or at-sea monitors in the fishery. This method, although logical, would rely heavily upon untested assumptions.

The PDT recommendation of a five percent adjustment for management uncertainty as a default was based upon several factors. The adjustment should be meaningful, and serve the function of a buffer, so that if the management measures and monitoring of the catch result in excessive catch, the catch will not exceed the ABC. Arguably, an adjustment in the ABC of only one or two percent may not serve its purpose, given the FMP uncertainties previously discussed. Secondly, five percent is within the range of uncertainty attributed to the closed area model (10%), used to analyze the effectiveness of most of the management measures. Notwithstanding the uncertainties of the FMP, a default percentage of greater than five percent is not warranted, given the more restrictive management measures proposed (compared to status quo), the Amendment 16 analysis, and the recent levels of fishing mortality, many of which are at historic lows.

The PDT next considered deviations from the default. Ideally, any deviations should be tailored to the management history of individual stocks, but as already noted there is limited information with which to base such differences. The PDT decided to recommend a standard adjustment for stocks with less uncertainty of 3 percent, setting the ACL at 97 percent of the ABC. Fro stocks with more uncertainty, the PDT originally recommended a standard adjustment of 10 percent, setting the ACL at 90 percent of the ABC. The Council noted, however, that there was no justification presented by the PDT to justify a larger adjustment for stocks with more uncertainty than is used for stocks with less uncertainty and directed the PDT to us an adjustment of 7 percent.

Analyze individual stocks in the context of the FMP for *elements* of management uncertainty to determine if particular stocks will be subject to more or less uncertainty than most.

<u>Georges Bank yellowtail flounder</u>
Georges Bank yellowtail flounder has been managed under a hard TAC in the context of the U.S./Canada Management Area rules since 2004. The Regional Administrator has the authority to modify management measures in-season (including trip limits, closures, days-at-sea, trips, and gear) in order to prevent both over-harvest and under-harvest of the TAC. The incorporation of in-season adjustment capability in the FMP is essentially an in-season accountability measure, and provides a relatively high level of *management precision*. Of the five completed fishing years since 2004, the TAC was only exceeded once (FY 2007, total catch was 9% over TAC). The principal reason for that overage was due to reporting and monitoring delays. Since that time, NMFS implemented changes to the monitoring procedures that will reduce the likelihood that *monitoring adequacy* will contribute to a TAC overage. For these reasons, the management uncertainty for GB yellowtail flounder is less than the fishery-wide uncertainty, and an adjustment of 3% is recommended.

<u>Southern New England (SNE) Yellowtail Flounder</u>
As discussed above, although there are limitations to the utility of historic information in assessing management uncertainty, the PDT considered historical catch patterns for this stock as relevant. That the catch of this stock exceeded the target TAC three times since 2004 is of concern. For fishing years 2006, 2007, and 2008, the catch to TAC ratio was 2.53, 1.86, and 1.62, respectively. The *management precision* of the FMP with respect to SNE yellowtail flounder has been relatively low historically. Secondly, there are higher discard rates of this stock than many other groundfish stocks, including *discards from other fisheries* such as fluke and scallop. For these reasons, the PDT concluded that the stock has greater management uncertainty than the fishery wide level, and an adjustment of 7% is recommended.

Gulf of Maine Haddock and Gulf of Maine Cod (Recreational sub-ACLs)
The proportional standard errors (pse) associated with the recreational data for these stocks is approximately 10%, and there is consensus that the *monitoring adequacy* of the recreational fishery is less than that associated with the commercial fishery. For these reasons, the PDT concluded that the fishery sub-components for these stocks have greater management uncertainty than the fishery wide level, and an adjustment of 7% is recommended.

SNE winter flounder, windowpane north, windowpane south, ocean pout, and Atlantic wolfish: These stocks either need significant reductions in fishing mortality or continued low levels of fishing mortality. Newly proposed management measures such as the restricted gear areas for the common pool, prohibitions on retention, and expanded sector management as well as the difficulty in achieving high *monitoring adequacy* of stocks that are either not targeted and/or encountered in low numbers, combine to create a situation where there is less *management precision* and greater management uncertainty. For these reasons, the PDT concluded that these stocks have greater management uncertainty than the fishery wide level, and an adjustment of 7% is recommended.

Gulf of Maine Haddock and GB Haddock Sub-Components for the Herring Fishery
The herring fishery is allocated .2 percent of the "TAC" for these haddock stocks. Although there is a haddock monitoring system in place in the herring fishery, the system was not designed to distinguish one haddock stock from another. Due to this weakness in the *monitoring adequacy* the PDT concluded that these ACL-subcomponents should be subject to the 7% adjustment.

Yellowtail Flounder Sub-Component for the scallop fishery
For FY 2010, there will be no downward adjustment of the yellowtail founder sub-component for scallop fishery (3 stocks of yellowtail). For future years, the downward adjustment may depend on the specific AMs adopted. Further work is needed on this issue, including whether the adjustment should be determined by the scallop or groundfish FMPs.

Appendix III

Calculation of Northeast Multispecies Annual Catch Limits, FY 2010 - FY 2012

This appendix documents the calculation of Northeast Multispecies Overfishing Levels (OFLs), Acceptable Biological Catches (ABCs), and Annual Catch Limits (ACLs) for FY 2010 - FY 2012. The general approach for all stocks is to first determine the OFL, then determine the ABC. The ABC is distributed to various components of the fishery, and then an adjustment is made to these "sub-ABCs" to determine the ACLs, sub-ACLs, or other sub-components.

Determining OFL and ABC

Stocks with Age-Based Assessments and Projections

Catch levels (including OFLs, ABCs, and ACLs) for the following stocks are based on age-based projections:

GB cod
GOM cod
GB haddock
GOM haddock
GB yellowtail flounder
CC/GOM yellowtail flounder
SNE/MA yellowtail flounder
GB winter flounder
SNE/MA winter flounder
Witch flounder
Plaice
White Hake
Redfish
Atlantic halibut

For most stocks, the projections were performed using the Northeast Fisheries Science Center's (NEFSC) AGEPRO projection model; the exception is white hake and Atlantic halibut, which used a projection model developed by SCAA/ASP. Initial conditions for the projections are based on five year averages (2003-2007) from the most recent assessment. For all stocks except GB yellowtail flounder, the most recent assessment was completed in GARM III (NEFSC 2008), and the terminal year in the assessment is 2007. GB yellowtail flounder was assessed by the Transboundary Resource Assessment Committee (TRAC) in 2009, with a terminal year of 2008.

There are a number of assumptions that must be made to complete the projections. All of these assumptions are potential sources of error. The assumptions for recruitment, selectivity, and weights-at-age that were used were those recommended by the GARM and TRAC review panels.

Since the first year for ACLs is 2010, an additional assumption must be made in the projections for the years between the terminal year and 2010. For the assessments with a terminal year of 2007, an estimate of 2008 catch developed by the NEFSC was input into the projection model. While these catches were calculated using the same techniques as were used by GARM III, the values have not been subject to a peer review and could be modified in the future when an assessment is completed. The 2008 catches used are shown in Table 1.

The assumption for 2009 was based on an estimate of 2009 fishing mortality. This estimate was developed after considering the expected impacts of the Northeast Multispecies interim action that was implemented May 1, 2009. For most stocks, the expected change in exploitation predicted to result from the interim action were applied to the 2008 mortality that results from the updated 2008 catch to get an estimate of the 2009 mortality. An exception was made for three stocks, two affected by the U.S./Canada Resource Sharing Understanding. The first is for GB yellowtail flounder. Since this stock is managed by a hard TAC, the 2009 TAC of 2100 mt was used in the projection (consistent with the projection approach used by the Transboundary Resource Assessment Committee (TRAC)). The second exception is for GB haddock. The interim action analysis cannot reliably predict GB haddock mortality because much of the catch comes from the Canadian fishery in recent years and this is not affected by U.S. management measures. The Canadian fishery has nearly harvested its TAC in recent years, so the 2009 TAC of 19,000 mt was assumed caught. The 2009 U.S. catch was assumed to be the same as the 2008 catch of 6,000 mt. Total 2009 GB haddock catch assumed was 25,000 mt. The 2009 catch assumption is not as critical for this stock since recent catches are well below catch projections for future years. The third exception is for Atlantic halibut. The 2009 catch was assumed to be 100 mt, a 40 percent increase from the four year average catch but only a 20 percent increase from the 2007 catch. An increase seems warranted since the Canadian TAC is increasing by 15 percent from 2008 to 2009 (only a small portion of this TAC is taken from the stock area used in the U.S. assessment).

When calculating the OFL in future years, F_{MSY} is used as the fishing mortality in the projection. When calculating the ABC, either 75% of F_{MSY} or Frebuild is used (whichever is lower. This is consistent with the ABC control rules recommended by the Science and Statistical Committee (SSC) and adopted in Amendment 16.). There were two exceptions. For GB yellowtail flounder, because there are two assessment models extant, FY 2011 and FY 2012 ABCs are preliminary and are expected to be revisited after the 2010 TRAC assessment. The ABCs for these two years shown were calculated using the “excluding” assessment model. Fishing year 2011 and FY 2012 mortality was set at the mortality that results from a 1500 mt catch in FY 2010. For SNE/MA winter flounder, the ABC was calculated using the fishing mortality expected to result from management measures designed to achieve a mortality as close to 0 as possible. Specific mortality targets used for the ABC projections are provided in Table 2.

Projection output used for setting ABCs is in Appendix IV.

Stocks with Index-Based Assessments

For these four stocks, the OFL was calculated as the F_{MSY} proxy applied to the most recent biomass estimate (a survey-based proxy). The ABC was calculated as 75% of F_{MSY} applied to the most recent biomass estimate. The index-based projection model was not used for any of these stocks.

Northern Windowpane Flounder
Southern Windowpane Flounder
Ocean Pout
Pollock

GOM Winter Flounder
GARMI III did not accept the GOM winter flounder assessment. As determined by the SSC, the ABC was set as 75 percent of the average catch for the most recent three years (CYY 2006/2007/2008).

Atlantic Wolffish
The OFL for Atlantic wolffish was established as F_{MSY} applied to the most recent estimate of exploitable biomass, while the ABC was set as 75% of F_{MSY} applied to the exploitable biomass. Alternative assumptions of selectivity and size at maturity provide a range of F_{MSY} and exploitable biomass estimates (e.g., F_{MSY} = 0.2 to 0.7 and exploitable biomass = 215 to 533 t). Based on the guidance from the DPSWG that F_{MSY} is most likely less than 0.35 and that survey-based estimates of size-at-maturity may not be reliable, the OFL and ABC are based on the assessment model that assumes steep selectivity and 75cm knife edge size at maturity.

Distribution of ABCs

Because the Council wants the ability to consider a different adjustment for management uncertainty for different components of the fishery, ABCs were first distributed to the components prior to applying this adjustment. A brief description of the components follows:

ABC: Acceptable Biological Catch for the entire stock.

Canadian Share/Allowance: An amount from the stock that Canadian vessels are expected to harvest. For GB cod, GB haddock, and GB yellowtail flounder, this is based on the Canadian allocation under the TMGC (but see the GB yellowtail flounder discussion below). For other stocks with substantial Canadian catches this is based on an estimate of Canadian catch.

U.S. ABC: That portion of the ABC available to U.S. fishermen after accounting for Canadian harvests.

State waters: Portion of the U.S. ABC expected to be harvested from state waters, outside of the federal management plan.

Other sub-components: Portion of the U.S. ABC expected to be harvested by unidentified non-groundfish fishery components. These are not attributed to specific components because individual amounts are small.

Scallops: Portion of U.S. ABC either allocated to, or expected to be harvested by, the U.S. scallop fishery.

Groundfish: Portion of the U.S. ABC available to the groundfish fishery (including recreational and commercial vessels). This ABC has several sub-components:

Commercial: Portion of the U.S. ABC available to commercial vessels; this is further sub-divided into sector and common-pool portions.

Recreational: Portion of the U.S. ABC available to commercial vessels.

MWT: Portion of the ABC available to herring mid-water trawl vessels. Currently only applies to the two haddock stocks.

Table 3 summarizes the distribution of the U.S. ABC to the various sub-components, while Table 4 provides the resulting ABCs. Details for specific stocks are provided below.

a. GOM cod: The division into sub-components was calculated differently for this stock based on the way the components were calculated by the PDT. First, the PDT calculated the recreational/commercial allocation as described in Amendment 16 using the numbers of fish caught (as determined by GARM III). This was done without regard to whether the fish were caught in state waters or not. In contrast, the state waters component (10 percent) came from a NMFS report required by the M-S Act reauthorization and included commercial catches only. Similarly, "other sub-components" represented only commercial catches since a specific recreational/commercial component was anticipated. The state waters component and the other sub-component portion are thus calculated as a percent of the commercial allocation (e.g. 10 percent of the 66.3 percent commercial allocation).

The recreational harvest of cod from state waters (without regard to stock) averaged 19 percent from 2001-2008, but was highly variable and ranged from 9 percent to 35 percent. Proportional standard errors (PSEs) are also high for the state waters components, indicating high uncertainty over these values. It is not known how much of the state waters recreational catch came from party/charter boats with federal permits that should be subject to ACL requirements. These factors make it difficult to determine what percentage of the recreational allocation is expected to be harvested from state waters.

The PDT calculated the groundfish recreational and commercial ACLs based on the recreational/commercial percentages as determined by the Council (based on historical data). Since some of the recreational catch comes from state waters, the ACL for recreational fishermen is higher than if a specific state water recreational allocation could be identified. It also means in order to monitor and account for recreational catch, all recreational catches (including state waters catches) should be applied against the ACL.

The commercial components (state waters, other sub-components, and federal waters) add to the total commercial allocation.

		Rec	Comm	Total
Shares,	Based on Total Catch, in Numbers	0.337	0.663	1.0
	ABC, Based on Totals	2,875	5,655	8,530
	State waters (assumed all commercial)		566	
	Other sub (assumed all commercial)		283	
	Adjusted ABC	2,875	4,807	

b. GOM haddock: This stock has similar issues as GOM cod. Calculations were done in a similar fashion. One difference is that there is a portion of this stock that is allocated to the MWT fishery. This is based on 0.2% of the total ABC. The ABC is first divided between the recreational and commercial fisheries, then 1% of the commercial share is allowed for state waters and 4% for other subcomponents. The MWT share is also subtracted from the commercial ABC.

		Rec	Comm	Total
Shares,	Based on Total Catch, in Numbers	0.275	0.725	1
	ABC, Based on Totals	348	917	1,265
	MWT Haddock		3	
	State waters (assumed all commercial)		9	
	Other sub (assumed all commercial)		37	
	Adjusted ABC		**869**	
	ACL	313	825	
	Total ABC for component	348	917	

c. GB yellowtail flounder: There is no state waters component because the stock area does not include state waters. Five percent is considered an “other subcomponent” caught in other fisheries. As described in the framework text, there is an allocation to the scallop fishery that is based on an estimate of the amount the fishery is expected to harvest if the scallop yield is taken. In FY 2010 this allocation is 100 percent of the amount expected to be harvested, while in FY 2011 and FY 2012 it is 90 percent of the amount expected to be harvested. In FY 2010 this is an “other subcomponent” and is not adjusted for management uncertainty.

d. SNE/MA yellowtail flounder: One percent is expected to be taken in state waters. Four percent is considered an “other subcomponent” caught in other fisheries. As described in the framework text, there is an allocation to the scallop fishery that is based on an estimate of the amount the fishery is expected to harvest if the scallop yield is taken. In FY 2010 this allocation is 100 percent of the amount expected to be harvested, while in FY 2011 and FY 2012 it is 90 percent of the amount expected to be harvested. In FY 2010 this is an “other subcomponent” and is not adjusted for management uncertainty.

e. GB winter flounder: There is no state waters allocation because the stock area does not include state waters.

f. GOM winter flounder: The recreational fishery is almost entirely in state waters. From 2005 to 2007, the recreational harvest averaged 29 mt, but increased to 107 mt in 2008. ASMFC is adopting management measures to reduce harvests 11 percent. The PDT has allowed 60 mt for state waters/recreational harvest for this stock. This is 89 percent of the 2007/2008 average, reflecting the expected impacts of ASMFC measures. This is 25 percent of the ABC.

g. SNE/MA winter flounder: Recreational harvest increased from 92 mt in 2004 to 167 mt in 2006, then declined to 75 mt in 2008. ASMFC is adopting management measures to reduce harvest 46 percent. The PDT allowed 53 mt in 2010 for recreational/state waters harvest for this stock, 54 percent of the 2007/2008 average. This is 8 percent of the ABC; 8 percent was used for FY 2011 and FY 2012; this gives a slightly larger allocation in future years, reflecting stock rebuilding.

h. Pollock: Recreational harvest increased to 912 mt in 2008, about 2.5 times the harvest from 2005 through 2007 and 24 percent of the ABC. Since 2001, about half of the recreational harvest has been from state waters. The PDT allowed 400 mt for recreational harvest, reflecting the approximate average amount harvested from 2003 through 2007. This value is split between state waters and the “other sub-components” category. Canadian catches in 2008 were 650 mt, but Canadian TACs are expected to decline on the order of 20 percent in 2010. The PDT allowed 520 mt for Canadian catches (80 percent of 2008).

i. Atlantic halibut: The PDT estimates that about 50 percent of halibut catches are by Maine state vessels from state waters.

ACLs

After the ABCs are distributed to the various components, they are adjusted for management uncertainty. As discussed in Appendix II, the default sets the ACL at 95 percent of the ABC. For stocks with less management uncertainty the ACL is set at 97 percent of the ABC; for stocks with more uncertainty it is set at 93 percent of the ACL. Adjustments are shown in Table 5. The rationale for deviation from 95 percent for specific stocks is provided below.

a. GOM cod: The management uncertainty associated with the recreational fishery is greater than that associated with the commercial fishery because data for the recreational fishery is more uncertain than that from the commercial fishery, the number of participants is unknown, the AMs for the recreational fishery are implemented after a time lag, and impacts of the management measures are less predictable. Therefore the ACL for the recreational component was set at 93 percent of the ABC.

b. GOM haddock: The MWT ACL was set at 93 percent of the ABC due to uncertainty over monitoring of the herring MWT fishery.

The management uncertainty associated with the recreational fishery is greater than that associated with the commercial fishery because data for the recreational fishery is more uncertain than that from the commercial fishery, the number of participants is unknown, the AMs for the recreational fishery are implemented after a time lag, and impacts of the management measures are less predictable. Therefore the ACL for the recreational component was set at 93 percent of the ABC.

c. GB yellowtail flounder: The management uncertainty is less for this stock because this stock has been successfully managed with a hard TAC for several years and there are in-season AMs (Regional Administrator authority to modify in-season measures including trip limits, closures, gear restrictions, etc.). Therefore, the PDT set the ACL at 97 percent of the ABC. The same percentage is used for the scallop fishery in FY 2011 and FY 2012. There is no state waters allocation because the stock area does not include state waters.

d. SNE/MA yellowtail flounder: This stock is the only stock where catches exceeded TTACs for several years. Also, non-groundfish fisheries may catch this stock. The PDT set the ACL at 93 percent of the ABC in recognition of the fact management measures may not be as effective at keeping catch levels below the desired catch level for this stock. The same percentage is used for the scallop fishery in FY 2011 and FY 2012.

e. SNE/MA winter flounder: The ACL was set at 93 percent of the ABC. With the adoption of Amendment 16, landings are prohibited, which will increase the uncertainty over catch. In addition, there are no controls on the catch of this stock by sector vessels other than a prohibition on retention (in contrast, the proposed measures for the common pool include two gear restricted areas that will help reduce impacts on this stock).

f. Windowpane flounders, ocean pout, Atlantic wolffish: Retention of these stocks is prohibited. In addition, there are no controls on the catches of these stocks by sector vessels other than a prohibition on retention. The ACL was set at 93 percent of the ABC, reflecting the additional uncertainty over catch.

g. GB haddock: The MWT ACL was set at 93 percent of the ABC due to uncertainty over monitoring of the herring MWT fishery.

Incidental Catch TACs

Part of the commercial non-sector ACL is allocated to the incidental catch TACs that limit catches of stocks of concern in the Category B (regular) DAS program and certain SAPs. Table 6 and Table 7 are reproduced from Amendment 16.

An incidental catch TAC is specified for American plaice even though GARM III determined this stock was not overfished and overfishing was not occurring. This was done for several reasons. First, stock size barely exceeds the minimum biomass threshold and is at 51% of B_{MSY}, and has not completed stock rebuilding. Given uncertainty in the assessment it was considered prudent to continue to control catches until certain that rebuilding is on track. Second, plaice is often caught with witch flounder, an overfished stock, and allowing vessels to target plaice in these programs would likely lead to excessive catches of witch flounder.

Table 1 – 2008 catch used in age-based projections

Stock	Actual 2008 Catch[1]				
	Landings	Commercial discards[2]	Recreational Landings or Harvest[3]	Canada	Total 2008 Catch
GB Cod	3,207	366	32	1,529	5,134
GB Haddock	5,744	343		14,814	20,901
GB Yellowtail(1)	748	370		158	1,276
SNE/MA Yellowtail	354	150			504
CC/GOM Yellowtail	566	161			727
GOM Cod	5,439	1,356	1,704		8,499
Witch Flounder	1,005	58			1,063
Plaice	1,106	242			1,348
GOM Winter Flounder	284	12	107		402
SNE/MA Winter Flounder	1,247	109	76		1,432
GB Winter Flounder	824	139			963
White Hake	1,876				1,876
Pollock	9,964		912	493	11,370
Redfish	1,190	174			1,364
GOM Haddock	575	11	611		1,197
Ocean pout	7	118			125
Northern window	34	316			350
Southern window	87	276			363

Notes:
1. Actual 2008 catch as calculated by NEFSC in July 2009. These numbers are preliminary until incorporated into an assessment.
2. For winter flounder stocks, discards are after application of a 50 percent mortality rate to commercial catch.
3. For winter flounder stocks, discard mortality for recreational catch is 15 percent.

Table 2 – Mortality targets used to calculate ABCs, FY 2010 – 2012

(1) Because there are two assessments for this stock, FY 2010 ABC recommended by the SSC was based on Frebuild used in both models. Future (FY 2011 and FY 2012) ABCs were based on the mortality that results from this ABC when projected forward from one of the models. See text for details.

Species	Stock	Basis for Target Fishing Mortality	Targeted Fishing Mortality	F_{msy}
Cod	**GB**	75%FMSY	0.184	0.2466
Cod	**GOM**	75%FMSY	0.18	0.237
Haddock	**GB**	75%FMSY	0.26	0.35
Haddock	**GOM**	75%FMSY	0.32	0.43
Yellowtail Flounder	**GB**	Frebuild(1)	0.018/0.086/(0.068)(1)	0.254
Yellowtail Flounder	**SNE/MA**	Frebuild	0.072	0.254
Yellowtail Flounder	**CC/GOM**	75%FMSY	0.18	0.239
American Plaice	**GB/GOM**	75%FMSY	0.14	0.19
Witch Flounder		75%FMSY	0.15	0.2
Winter Flounder	**GB**	75%FMSY	0.2	0.26
Winter Flounder	**GOM**	75% average catch	n/a	0.283
Winter Flounder	**SNE/MA**	See text	0	0.248
Redfish		75%FMSY	0.03	0.038
White Hake	**GB/GOM**	Frebuild	0.084	0.125
Pollock	**GB/GOM**	See text	4.245	5.66
Windowpane	**GOM/GB**	75%FMSY	n/a	0.5
Windowpane	**SNE/MA**	75%FMSY	n/a	1.47
Ocean Pout		75%FMSY	n/a	0.76
Atlantic Halibut		Frebuild	0.044	0.073
Atlantic Wolffish		75% FMSY	See text	

Table 3 – Distribution of ABC to fishery components.
(1) Includes commercial ABC in state waters and other subcomponents

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Cod	2010	4,812	1,012	3,800	0.01	0.04		0.95	0.95		0.949389974	
	2011	5,616	0	5,616	0.01	0.04		0.95	0.95		0.949389974	
	2012	6,214	0	6,214	0.01	0.04		0.95	0.95		0.949389974	
GOM Cod	2010	8,530	0	8,530	0.10	0.05		na	0.663	0.337	0.926205087	
	2011	9,012	0	9,012	0.10	0.05		na	0.663	0.337	0.926205087	
	2012	9,018	0	9,018	0.10	0.05		na	0.663	0.337	0.926205087	
GB Haddock	2010	62,515	17,612	44,903	0.01	0.04		0.95	0.95		0.972129238	0.002
	2011	46,784	0	46,784	0.01	0.04		0.95	0.95		0.972129238	0.002
	2012	39,846	0	39,846	0.01	0.04		0.95	0.95		0.972129238	0.002
GOM Haddock	2010	1,265		1,265	0.01	0.04		na	0.725	0.275	0.952531093	0.002
	2011	1,206		1,206	0.01	0.04		na	0.725	0.275	0.952531093	0.002
	2012	1,013		1,013	0.01	0.04		na	0.725	0.275	0.952531093	0.002
GB Yellowtail Flounder	2010	1,500	300	1,200	0.00	0.05	0.092	0.858	0.858		0.93516549	
	2011	1,689	608	1,081	0.00	0.05	0.188	0.762	0.762		0.93516549	
	2012	1,916	690	1,226	0.00	0.05	0.259	0.691	0.691		0.93516549	
SNE/MA Yellowtail Flounder	2010	493		493	0.01	0.04	0.225	0.725	0.725		0.726460172	
	2011	687		687	0.01	0.04	0.124	0.826	0.826		0.726460172	
	2012	1,003		1,003	0.01	0.04	0.136	0.814	0.814		0.726460172	
CC/GOM Yellowtail Flounder	2010	863		863	0.01	0.04		0.95	0.95		0.932830303	
	2011	1,041		1,041	0.01	0.04		0.95	0.95		0.932830303	
	2012	1,159		1,159	0.01	0.04		0.95	0.95		0.932830303	
Plaice	2010	3,156		3,156	0.01	0.04		0.95	0.95		0.935528195	
	2011	3,444		3,444	0.01	0.04		0.95	0.95		0.935528195	
	2012	3,632		3,632	0.01	0.04		0.95	0.95		0.935528195	
Witch Flounder	2010	944		944	0.01	0.04		0.95	0.95		0.950533446	
	2011	1,369		1,369	0.01	0.04		0.95	0.95		0.950533446	
	2012	1,639		1,639	0.01	0.04		0.95	0.95		0.950533446	

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Ground-fish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
GB Winter Flounder	2010	2,052		2,052	0.00	0.05		0.95	0.95		0.970333537	
	2011	2,224		2,224	0.00	0.05		0.95	0.95		0.970333537	
	2012	2,543		2,543	0.00	0.05		0.95	0.95		0.970333537	
GOM Winter Flounder	2010	238		238	0.25	0.05		0.70	0.70		0.835133988	
	2011	238		238	0.25	0.05		0.70	0.70		0.835133988	
	2012	238		238	0.25	0.05		0.70	0.70		0.835133988	
SNE/MA Winter Flounder	2010	644		644	0.08	0.05		0.87	0.87			
	2011	897		897	0.08	0.05		0.87	0.87			
	2012	1,198		1,198	0.08	0.05		0.87	0.87			
Redfish	2010	7,586		7,586	0.01	0.04		0.95	0.95		0.965879893	
	2011	8,356		8,356	0.01	0.04		0.95	0.95		0.965879893	
	2012	9,224		9,224	0.01	0.04		0.95	0.95		0.965879893	
White Hake	2010	2,832		2,832	0.01	0.04		0.95	0.95		0.952587679	
	2011	3,295		3,295	0.01	0.04		0.95	0.95		0.952587679	
	2012	3,638		3,638	0.01	0.04		0.95	0.95		0.952587679	
Pollock	2010	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
	2011	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
	2012	3,813	520	3,293	0.06	0.06		0.88	0.88		0.956936325	
N. Window-pane Flounder	2010	169		169	0.01	0.29		0.70	0.70			
	2011	169		169	0.01	0.29		0.70	0.70			
	2012	169		169	0.01	0.29		0.70	0.70			
S. Window-pane Flounder	2010	237		237	0.01	0.29		0.70	0.70			
	2011	237		237	0.01	0.29		0.70	0.70			
	2012	237		237	0.01	0.29		0.70	0.70			
Ocean Pout	2010	271		271	0.01	0.04		0.95	0.95			
	2011	271		271	0.01	0.04		0.95	0.95			
	2012	271		271	0.01	0.04		0.95	0.95			

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Components	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	MWT
Atlantic Halibut	2010	71		71	0.50	0.05		0.45	0.45			
	2011	78		78	0.50	0.05		0.45	0.45			
	2012	85		85	0.50	0.05		0.45	0.45			
Atlantic Wolffish	2010	83		83	0.01	0.04		0.95	0.95			
	2011	83		83	0.01	0.04		0.95	0.95			
	2012	83		83	0.01	0.04		0.95	0.95			

Table 4 – Distribution of ABC to fishery components

(1) Includes commercial ABC in state waters and other sub-components

Stock	Year	ABC	Canadian Share/ Allowance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Groundfish	Comm Groundfish	Rec Groundfish	Sector PSC	Non-Sector	MWT
GB Cod	2010	4,812	1,012	3,800	38	152	0	3,610	3,610	0	3,427	183	0
	2011	5,616	0	5,616	56	225	0	5,335	5,335	0	5,065	270	0
	2012	6,214	0	6,214	62	249	0	5,903	5,903	0	5,605	299	0
GOM Cod	2010	8,530	0	8,530	566	283	0	8,530	5,655 (1)	2,875	4,452	355	0
	2011	9,012	0	9,012	597	299	0	9,012	5,975 (1)	3,037	4,704	375	0
	2012	9,018	0	9,018	598	299	0	9,018	5,979 (1)	3,039	4,707	375	0
GB Haddock	2010	62,515	17,612	44,903	449	1,796	0	42,568	42,568	0	41,382	1,186	90
	2011	46,784	0	46,784	468	1,871	0	44,351	44,351	0	43,115	1,236	94
	2012	39,846	0	39,846	398	1,594	0	37,774	37,774	0	36,721	1,053	80
GOM Haddock	2010	1,265		1,265	9	37	0	1,265	917 (1)	348	828	41	3
	2011	1,206		1,206	9	35	0	1,206	874 (1)	332	789	39	2
	2012	1,013		1,013	7	29	0	1,013	734 (1)	279	663	33	2
GB Yellowtail Flounder	2010	1,500	300	1,200	0	60	110	1,030	1,030	0	963	67	0
	2011	1,689	608	1,081	0	54	203	824	824	0	770	53	0
	2012	1,916	690	1,226	0	61	318	847	847	0	792	55	0
SNE/MA Yellowtail Flounder	2010	493		493	5	20	111	357	357	0	260	98	0
	2011	687		687	7	27	86	567	567	0	412	155	0
	2012	1,003		1,003	10	40	136	817	817	0	593	223	0
CC/GOM Yellowtail Flounder	2010	863		863	9	35	0	820	820	0	765	55	0
	2011	1,041		1,041	10	42	0	989	989	0	923	66	0
	2012	1,159		1,159	12	46	0	1,101	1,101	0	1,027	74	0
Plaice	2010	3,156		3,156	32	126	0	2,998	2,998	0	2,805	193	0
	2011	3,444		3,444	34	138	0	3,272	3,272	0	3,061	211	0
	2012	3,632		3,632	36	145	0	3,450	3,450	0	3,228	222	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Witch Flounder	2010	944		944	9	38	0	897	897	0	852	44	0
	2011	1,369		1,369	14	55	0	1,301	1,301	0	1,236	64	0
	2012	1,639		1,639	16	66	0	1,557	1,557	0	1,480	77	0
GB Winter Flounder	2010	2,052		2,052	0	103	0	1,949	1,949	0	1,892	58	0
	2011	2,224		2,224	0	111	0	2,113	2,113	0	2,050	63	0
	2012	2,543		2,543	0	127	0	2,416	2,416	0	2,344	72	0
GOM Winter Flounder	2010	238		238	60	12	0	166	166	0	139	27	0
	2011	238		238	60	12	0	166	166	0	139	27	0
	2012	238		238	60	12	0	166	166	0	139	27	0
SNE/MA Winter Flounder	2010	644		644	53	32	0	559	559	0	0	559	0
	2011	897		897	72	45	0	780	780	0	0	780	0
	2012	1,198		1,198	96	60	0	1,042	1,042	0	0	1,042	0
Redfish	2010	7,586		7,586	76	303	0	7,207	7,207	0	6,961	246	0
	2011	8,356		8,356	84	334	0	7,938	7,938	0	7,667	271	0
	2012	9,224		9,224	92	369	0	8,763	8,763	0	8,464	299	0
White Hake	2010	2,832		2,832	28	113	0	2,690	2,690	0	2,563	128	0
	2011	3,295		3,295	33	132	0	3,130	3,130	0	2,982	148	0
	2012	3,638		3,638	36	146	0	3,456	3,456	0	3,292	164	0
Pollock	2010	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
	2011	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
	2012	3,813	520	3,293	200	200	0	2,893	2,893	0	2,768	125	0
N. Window-pane Flounder	2010	169		169	2	49	0	118	118	0	0	118	0
	2011	169		169	2	49	0	118	118	0	0	118	0
	2012	169		169	2	49	0	118	118	0	0	118	0
S. Window-pane Flounder	2010	237		237	2	69	0	166	166	0	0	166	0
	2011	237		237	2	69	0	166	166	0	0	166	0
	2012	237		237	2	69	0	166	166	0	0	166	0

Stock	Year	ABC	Canadian Share/ Allow-ance	US ABC	State Waters	Other Sub-Compo-nents	Scallops	Ground-fish	Comm Ground-fish	Rec Ground-fish	Sector PSC	Non-Sector	MWT
Ocean Pout	2010	271		271	3	11	0	257	257	0	0	257	0
	2011	271		271	3	11	0	257	257	0	0	257	0
	2012	271		271	3	11	0	257	257	0	0	257	0
Atlantic Halibut	2010	71		71	36	4	0	32	32	0	0	32	0
	2011	78		78	39	4	0	35	35	0	0	35	0
	2012	85		85	43	4	0	38	38	0	0	38	0
Atlantic Wolffish	2010	83		83	1	3	0	79	79	0	0	79	0
	2011	83		83	1	3	0	79	79	0	0	79	0
	2012	83		83	1	3	0	79	79	0	0	79	0

Table 5 – ACL adjustments

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non_ Sector Groundfish	Rec Groundfish	Sector PSC	MWT
GB Cod	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
GOM Cod	2010	1	1	1	0.95	0.95	0.93	0.95	1
	2011	1	1	1	0.95	0.95	0.93	0.95	1
	2012	1	1	1	0.95	0.95	0.93	0.95	1
GB Haddock	2010	1	1	1	0.95	0.95	0.95	0.95	0.93
	2011	1	1	1	0.95	0.95	0.95	0.95	0.93
	2012	1	1	1	0.95	0.95	0.95	0.95	0.93
GOM Haddock	2010	1	1	1	0.95	0.95	0.93	0.95	0.93
	2011	1	1	1	0.95	0.95	0.93	0.95	0.93
	2012	1	1	1	0.95	0.95	0.93	0.95	0.93
GB Yellowtail Flounder	2010	1	1	1	0.97	0.97	0.95	0.97	1
	2011	1	1	0.97	0.97	0.97	0.95	0.97	1
	2012	1	1	0.97	0.97	0.97	0.95	0.97	1
SNE/MA Yellowtail Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	0.93	0.93	0.93	0.95	0.93	1
	2012	1	1	0.93	0.93	0.93	0.95	0.93	1
CC/GOM Yellowtail Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Plaice	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Witch Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non-Sector Groundfish	Rec Groundfish	Sector PSC	MWT
GB Winter Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
GOM Winter Flounder	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
SNE/MA Winter Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
Redfish	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
White Hake	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Pollock	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
N. Windowpane Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
S. Windowpane Flounder	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1
Ocean Pout	2010	1	1	1	0.93	0.93	0.95	0.93	1
	2011	1	1	1	0.93	0.93	0.95	0.93	1
	2012	1	1	1	0.93	0.93	0.95	0.93	1

Stock	Year	State Waters	Other Sub-Components	Scallops	Groundfish	Comm/Non-Sector Groundfish	Rec Groundfish	Sector PSC	MWT
Atlantic Halibut	2010	1	1	1	0.95	0.95	0.95	0.95	1
	2011	1	1	1	0.95	0.95	0.95	0.95	1
	2012	1	1	1	0.95	0.95	0.95	0.95	1
Atlantic Wolffish	2010	1	1	1	0.93	0.93	0.95	0.95	1
	2011	1	1	1	0.93	0.93	0.95	0.95	1
	2012	1	1	1	0.93	0.93	0.95	0.95	1

Table 6 – Proposed incidental catch TACs for major stocks of concern (mt). TACs are for the fishing year. TACs shown are metric tons, live weight. Note: GB cod and GB yellowtail flounder TAC is determined annually and cannot be estimated in advance. Values are dependent on ACLs, which have not yet been determined.

	Percentage of ACL
GB cod	Two
GOM cod	One
GB Yellowtail	Two
CC/GOM yellowtail	One
SNE/MA Yellowtail	One
Plaice	Five
Witch Flounder	Five
SNE/MA Winter Flounder	One
GB Winter Flounder	Two
White Hake	Two
Pollock	Two

Table 7 - Proposed allocation of incidental catch TACs for major stocks of concern to Category B DAS programs (shown as percentage of the incidental catch TAC)

	Category B (regular) DAS Program	CAI Hook Gear SAP	Eastern US/CA Haddock SAP	Southern CAII Haddock SAP
GOM cod	100%	NA	NA	
GB cod	50%	16%	34%	
CC/GOM yellowtail	100%	NA	NA	
Plaice	100%	NA	NA	
White Hake	100%	NA	NA	
SNE/MA Yellowtail	100%	NA	NA	
SNE/MA Winter Flounder	100%	NA	NA	
Witch Flounder	100%	NA	NA	
GB Yellowtail	50%	NA	50%	
GB Winter Flounder	50%	NA	50%	
Pollock	50%	16%	34%	

Appendix IV

Acceptable Biological Catch (ABC)

Projection Output

A16 ABC AGEPRO Projection Output

Georges Bank Cod

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 GB cod: 2007 ty 40% ypr  2 stage rct svswept split

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\AGBCOD\A_GBCOD_NEWEST08CAT_INTERIM09_75FM
 SY.IN


 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\AGBCOD\A_GBCOD_NEWEST08CAT_INTERIM09_75FM
 SY.OUT


 RECRUITMENT MODEL:           15
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:           20
 TOTAL NUMBER OF SIMULATIONS:        20000
 NUMBER OF FEASIBLE SIMULATIONS:        20000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             5.134
 2009  0.222
 2010  0.185
 2011  0.185
 2012  0.185
 2013  0.185
 2014  0.185
 2015  0.185
 2016  0.185
 2017  0.185
 2018  0.185
 2019  0.185
 2020  0.185
 2021  0.185
 2022  0.185
 2023  0.185
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 2049  0.185
 2050  0.185
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2051	0.185
2052	0.185
2053	0.185
2054	0.185
2055	0.185
2056	0.185
2057	0.185

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	21.628	3.706
2009	26.566	5.321
2010	32.121	7.678
2011	36.856	9.124
2012	40.536	9.358
2013	44.416	10.419
2014	47.696	13.418
2015	51.988	18.051
2016	57.228	23.675
2017	63.288	29.792
2018	70.414	35.367
2019	78.465	40.548
2020	87.084	45.142
2021	95.919	48.941
2022	104.617	51.779
2023	113.074	53.742
2024	121.102	54.910
2025	128.524	55.385
2026	135.296	55.263
2027	141.389	54.644
2028	146.769	53.655
2029	151.522	52.288
2030	155.765	50.669
2031	159.436	48.933
2032	162.592	47.165
2033	165.374	45.431
2034	167.928	43.751
2035	170.245	42.114
2036	172.265	40.611
2037	173.963	39.196
2038	175.324	37.842
2039	176.509	36.556
2040	177.560	35.333
2041	178.511	34.170
2042	179.321	33.032
2043	179.997	31.984
2044	180.646	31.090
2045	181.141	30.324
2046	181.626	29.570
2047	182.087	28.912
2048	182.408	28.300
2049	182.683	27.690
2050	183.033	27.227
2051	183.347	26.919
2052	183.538	26.640
2053	183.763	26.370
2054	184.036	26.158
2055	184.267	25.921
2056	184.430	25.661
2057	184.536	25.552

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	14.329	15.984	16.954	18.887	21.389	23.966	26.333	28.265	31.161
2009	16.382	18.626	19.971	22.575	26.020	30.255	33.598	35.939	40.028
2010	18.944	21.921	23.370	26.585	31.378	36.307	41.711	45.771	53.295
2011	21.893	25.091	27.004	30.714	35.602	41.319	47.847	52.476	64.123
2012	24.489	28.115	30.379	34.321	39.395	45.183	51.382	56.193	69.901
2013	27.566	31.388	33.764	37.937	43.102	48.780	55.303	61.223	85.421
2014	29.266	33.439	35.827	40.052	45.183	51.120	59.976	73.353	104.008
2015	31.228	35.306	37.716	41.995	47.220	54.316	71.936	93.058	125.211

2016	32.419	36.677	39.281	43.478	49.141	59.324	91.630	113.098	145.103
2017	33.224	37.552	40.025	44.494	50.953	70.925	111.079	131.640	160.836
2018	33.686	38.304	40.873	45.667	53.782	89.039	128.305	146.365	173.824
2019	34.109	38.852	41.598	46.742	58.648	107.079	142.693	158.834	186.704
2020	34.523	39.316	42.245	47.922	70.582	123.061	155.343	170.191	196.750
2021	35.029	39.877	42.872	49.310	88.370	136.632	165.489	180.372	205.349
2022	35.457	40.416	43.534	51.123	104.865	148.161	174.565	188.715	212.256
2023	35.834	40.845	44.301	53.868	119.653	157.624	182.178	195.689	217.651
2024	36.286	41.459	45.158	59.150	131.734	165.751	188.196	201.202	222.461
2025	36.527	42.019	46.098	71.636	142.243	172.181	193.597	205.428	226.832
2026	36.600	42.751	47.109	89.789	150.004	177.063	197.940	208.891	230.372
2027	37.070	43.580	48.417	106.747	156.225	181.509	200.841	213.179	233.824
2028	37.539	44.363	49.972	120.258	160.781	184.621	203.794	215.611	237.292
2029	38.376	45.159	52.204	130.678	164.474	187.015	206.460	217.967	238.752
2030	38.809	45.920	55.834	138.286	167.867	189.184	208.019	219.600	239.896
2031	38.933	47.159	63.566	144.059	170.291	190.900	209.202	220.115	239.842
2032	39.352	48.688	78.699	148.321	171.935	192.684	210.366	221.035	240.361
2033	39.929	50.005	96.470	151.662	173.700	193.919	211.019	221.600	241.169
2034	40.911	52.286	112.377	154.445	175.357	194.666	212.157	222.591	241.421
2035	41.447	56.251	123.750	156.568	176.783	195.721	213.051	223.329	242.270
2036	41.780	63.806	131.731	158.346	177.946	196.804	213.583	223.862	243.220
2037	42.572	79.274	137.178	159.772	178.868	197.387	214.388	224.572	244.555
2038	43.514	97.926	140.370	161.055	179.432	197.672	214.601	225.190	244.767
2039	44.086	111.606	142.645	161.759	179.955	198.052	214.732	225.952	244.996
2040	44.892	121.325	144.539	162.659	180.545	198.384	215.287	225.744	245.096
2041	45.878	127.449	146.284	163.557	180.875	198.627	215.765	225.555	245.362
2042	46.543	132.829	147.400	164.086	181.274	199.187	215.683	225.423	245.173
2043	47.874	135.765	148.643	164.607	181.420	199.271	215.668	225.466	245.097
2044	49.618	138.190	149.535	164.922	181.816	199.187	216.197	225.528	245.332
2045	51.989	139.677	150.335	165.181	181.952	199.448	215.913	226.187	245.737
2046	55.010	141.006	150.872	165.563	182.177	199.517	216.305	226.090	244.614
2047	60.412	141.772	151.407	165.888	182.238	199.920	216.095	226.177	245.207
2048	74.430	142.735	151.797	166.008	182.387	200.057	216.119	225.931	245.253
2049	95.041	143.427	152.321	166.339	182.568	199.883	215.902	225.440	246.386
2050	109.327	143.972	152.655	166.601	183.040	200.035	216.040	225.976	245.136
2051	119.401	144.413	152.803	166.817	183.049	200.357	216.572	225.874	246.285
2052	123.310	144.749	152.806	167.035	182.990	200.303	216.583	226.814	245.671
2053	125.155	144.781	152.887	167.115	182.944	200.480	216.975	226.713	245.004
2054	126.747	145.336	153.332	167.139	183.295	200.591	216.977	227.200	245.504
2055	128.038	145.727	153.915	167.370	183.661	200.746	217.173	226.983	245.219
2056	129.733	146.009	153.814	167.573	183.733	200.778	217.293	227.167	245.193
2057	129.248	146.056	153.780	167.496	183.691	201.146	217.071	227.217	244.276

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 148.084 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.002
2016	0.008
2017	0.022
2018	0.047
2019	0.082
2020	0.127
2021	0.184
2022	0.251
2023	0.320
2024	0.390
2025	0.458
2026	0.515
2027	0.568
2028	0.615
2029	0.657
2030	0.696
2031	0.725
2032	0.752
2033	0.778

2034	0.799
2035	0.818
2036	0.833
2037	0.848
2038	0.861
2039	0.872
2040	0.881
2041	0.890
2042	0.896
2043	0.904
2044	0.908
2045	0.913
2046	0.919
2047	0.920
2048	0.925
2049	0.928
2050	0.931
2051	0.933
2052	0.933
2053	0.933
2054	0.937
2055	0.939
2056	0.939
2057	0.939

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 0.994

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 10

YEAR	AVG MEAN B (000 MT)	STD
2008	31.610	6.021
2009	36.704	8.479
2010	42.075	9.838
2011	46.564	10.702
2012	50.558	12.219
2013	55.219	15.530
2014	59.922	20.766
2015	65.935	27.041
2016	73.120	33.672
2017	81.355	40.299
2018	90.550	46.190
2019	100.385	51.394
2020	110.460	55.716
2021	120.457	59.022
2022	130.184	61.342
2023	139.434	62.777
2024	148.024	63.403
2025	155.923	63.342
2026	163.028	62.725
2027	169.343	61.638
2028	174.981	60.115
2029	179.937	58.300
2030	184.260	56.328
2031	188.022	54.315
2032	191.331	52.328
2033	194.348	50.355
2034	197.065	48.472
2035	199.431	46.707
2036	201.417	45.044
2037	203.070	43.469
2038	204.484	41.959
2039	205.733	40.523
2040	206.839	39.133
2041	207.785	37.810
2042	208.635	36.584
2043	209.363	35.529
2044	209.974	34.595
2045	210.565	33.723
2046	211.064	32.931
2047	211.438	32.183
2048	211.832	31.495

2049	212.214	30.953
2050	212.528	30.535
2051	212.817	30.204
2052	213.079	29.904
2053	213.373	29.618
2054	213.650	29.320
2055	213.832	29.064
2056	213.952	28.913
2057	214.044	28.800

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	20.091	22.663	24.147	27.196	31.124	35.466	39.518	42.338	46.858
2009	22.055	25.270	27.086	30.633	35.831	41.311	47.339	51.708	60.020
2010	25.393	29.067	31.253	35.340	40.851	47.099	54.105	58.923	70.808
2011	28.547	32.593	35.126	39.557	45.231	51.759	58.702	64.140	82.232
2012	31.489	35.850	38.435	43.094	48.882	55.231	62.699	71.562	99.343
2013	34.159	38.922	41.566	46.418	52.177	58.795	70.369	86.225	119.442
2014	36.173	40.793	43.519	48.334	54.229	62.210	84.370	107.299	142.508
2015	37.730	42.392	45.318	50.086	56.382	69.373	105.706	128.961	165.413
2016	38.781	43.653	46.569	51.563	58.718	83.499	126.900	149.710	182.721
2017	39.405	44.592	47.457	52.784	61.972	102.764	146.795	167.450	199.660
2018	39.851	45.310	48.279	54.061	69.020	122.678	163.527	182.130	213.545
2019	40.374	45.789	49.081	55.377	82.895	141.061	178.438	195.200	225.100
2020	41.065	46.471	49.789	56.930	101.823	156.594	189.901	206.491	234.930
2021	41.522	47.017	50.548	58.963	120.444	170.142	200.385	216.365	242.974
2022	41.938	47.605	51.359	62.347	137.153	181.279	208.991	224.106	248.583
2023	42.480	48.266	52.383	69.556	151.746	190.589	216.134	230.603	255.160
2024	42.760	48.880	53.400	84.168	163.808	197.983	222.627	236.056	260.280
2025	42.813	49.746	54.531	103.601	173.058	204.244	227.622	240.193	264.339
2026	43.279	50.661	56.006	122.796	180.353	209.254	231.217	245.011	268.456
2027	43.828	51.532	57.793	138.157	185.770	213.137	234.678	247.916	272.778
2028	44.640	52.370	60.348	150.610	190.338	215.930	237.445	251.046	274.277
2029	45.325	53.292	65.124	159.840	194.261	218.366	240.097	252.973	275.721
2030	45.489	54.644	75.104	166.756	197.034	220.620	241.324	253.459	275.759
2031	45.909	56.180	91.505	171.911	199.378	222.559	242.768	254.757	276.713
2032	46.684	57.796	111.340	176.056	201.368	224.066	243.711	255.646	277.517
2033	47.489	60.410	128.519	179.227	203.362	225.099	244.948	256.462	277.847
2034	48.153	65.472	142.719	181.785	204.807	226.418	245.925	257.412	278.576
2035	48.645	75.141	152.594	183.800	206.292	227.671	246.558	258.014	280.077
2036	49.314	92.747	159.082	185.404	207.190	228.370	247.401	258.750	281.548
2037	50.461	112.580	163.197	187.090	208.098	228.847	247.765	259.476	281.604
2038	51.148	128.591	166.019	187.932	208.664	229.043	248.107	260.272	281.761
2039	52.206	140.350	168.157	189.036	209.370	229.388	248.580	260.588	281.882
2040	52.982	148.628	170.280	190.055	209.716	229.782	249.271	260.043	282.335
2041	54.137	154.558	171.553	190.732	210.194	230.473	249.025	260.076	281.725
2042	55.588	158.177	173.025	191.269	210.494	230.476	249.147	260.043	282.039
2043	57.564	161.020	174.095	191.814	210.857	230.526	249.696	260.167	282.036
2044	59.836	162.980	175.041	192.104	211.015	230.801	249.542	260.850	282.357
2045	63.621	164.470	176.007	192.506	211.220	231.084	249.716	260.966	281.830
2046	71.471	165.405	176.370	192.888	211.379	231.281	249.578	260.563	281.739
2047	87.472	166.385	177.048	193.009	211.583	231.419	249.430	260.388	282.024
2048	107.541	167.443	177.421	193.470	211.760	231.408	249.325	260.443	282.907
2049	126.912	168.036	177.863	193.655	212.258	231.439	249.311	260.395	282.959
2050	138.538	168.550	178.081	193.999	212.181	231.737	250.112	260.551	283.003
2051	143.747	168.836	178.132	194.415	212.350	231.999	250.159	261.401	282.644
2052	146.536	169.171	178.298	194.338	212.269	232.005	250.554	261.686	281.946
2053	148.221	169.651	178.842	194.379	212.621	232.151	250.568	261.863	282.028
2054	150.158	170.021	179.406	194.686	213.000	232.381	250.720	261.744	282.614
2055	151.485	170.611	179.202	194.894	213.065	232.413	250.645	262.215	282.226
2056	151.317	170.339	179.123	194.924	213.104	232.668	250.608	261.991	282.027
2057	152.912	170.378	179.264	194.913	213.130	232.601	250.979	262.148	283.202

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 176.836 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000

2014	0.001
2015	0.004
2016	0.014
2017	0.034
2018	0.063
2019	0.105
2020	0.151
2021	0.211
2022	0.278
2023	0.347
2024	0.411
2025	0.473
2026	0.525
2027	0.574
2028	0.619
2029	0.659
2030	0.689
2031	0.718
2032	0.744
2033	0.769
2034	0.786
2035	0.805
2036	0.819
2037	0.833
2038	0.844
2039	0.855
2040	0.862
2041	0.871
2042	0.876
2043	0.884
2044	0.888
2045	0.894
2046	0.897
2047	0.901
2048	0.903
2049	0.908
2050	0.908
2051	0.909
2052	0.909
2053	0.913
2054	0.917
2055	0.917
2056	0.917
2057	0.918

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 0.993

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 10

YEAR	AVG F_WT_B	STD
2008	0.168	0.032
2009	0.127	0.015
2010	0.117	0.011
2011	0.125	0.011
2012	0.127	0.011
2013	0.129	0.011
2014	0.129	0.012
2015	0.128	0.014
2016	0.126	0.014
2017	0.125	0.015
2018	0.124	0.015
2019	0.124	0.015
2020	0.124	0.014
2021	0.125	0.014
2022	0.126	0.014
2023	0.127	0.014
2024	0.129	0.013
2025	0.130	0.013
2026	0.131	0.013
2027	0.132	0.012
2028	0.133	0.012

2029	0.133	0.012
2030	0.134	0.012
2031	0.135	0.011
2032	0.135	0.011
2033	0.135	0.011
2034	0.136	0.010
2035	0.136	0.010
2036	0.137	0.010
2037	0.137	0.010
2038	0.137	0.009
2039	0.137	0.009
2040	0.137	0.009
2041	0.138	0.009
2042	0.138	0.009
2043	0.138	0.009
2044	0.138	0.009
2045	0.138	0.009
2046	0.138	0.008
2047	0.138	0.008
2048	0.138	0.008
2049	0.138	0.008
2050	0.138	0.008
2051	0.138	0.008
2052	0.138	0.008
2053	0.138	0.008
2054	0.138	0.008
2055	0.138	0.008
2056	0.138	0.008
2057	0.138	0.008

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 10

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.109	0.121	0.130	0.145	0.165	0.189	0.212	0.225	0.254
2009	0.085	0.100	0.107	0.118	0.128	0.138	0.146	0.151	0.159
2010	0.093	0.099	0.103	0.110	0.117	0.125	0.132	0.136	0.142
2011	0.100	0.107	0.111	0.117	0.124	0.132	0.138	0.142	0.149
2012	0.103	0.110	0.114	0.120	0.127	0.135	0.141	0.145	0.152
2013	0.099	0.110	0.115	0.123	0.130	0.137	0.143	0.146	0.153
2014	0.093	0.105	0.113	0.122	0.130	0.137	0.143	0.147	0.153
2015	0.091	0.101	0.107	0.120	0.130	0.137	0.143	0.147	0.153
2016	0.089	0.099	0.105	0.118	0.128	0.137	0.143	0.147	0.153
2017	0.089	0.097	0.103	0.115	0.127	0.135	0.142	0.146	0.153
2018	0.089	0.097	0.102	0.113	0.126	0.135	0.142	0.145	0.152
2019	0.089	0.097	0.103	0.113	0.126	0.135	0.141	0.145	0.152
2020	0.089	0.098	0.104	0.115	0.126	0.135	0.141	0.145	0.152
2021	0.090	0.099	0.105	0.116	0.127	0.135	0.142	0.145	0.151
2022	0.090	0.100	0.106	0.118	0.128	0.136	0.142	0.146	0.152
2023	0.091	0.101	0.107	0.119	0.129	0.137	0.143	0.146	0.152
2024	0.092	0.102	0.109	0.121	0.131	0.138	0.144	0.147	0.152
2025	0.092	0.104	0.111	0.123	0.132	0.139	0.144	0.148	0.153
2026	0.093	0.105	0.113	0.124	0.133	0.140	0.145	0.148	0.153
2027	0.095	0.107	0.115	0.125	0.134	0.140	0.146	0.148	0.154
2028	0.094	0.108	0.116	0.127	0.134	0.141	0.146	0.149	0.154
2029	0.095	0.109	0.118	0.128	0.135	0.142	0.146	0.149	0.154
2030	0.096	0.111	0.119	0.128	0.136	0.142	0.147	0.150	0.154
2031	0.098	0.113	0.121	0.129	0.136	0.142	0.147	0.150	0.154
2032	0.100	0.115	0.122	0.130	0.137	0.142	0.147	0.150	0.155
2033	0.100	0.116	0.123	0.130	0.137	0.143	0.147	0.150	0.154
2034	0.101	0.118	0.123	0.130	0.137	0.143	0.147	0.150	0.155
2035	0.102	0.119	0.124	0.131	0.137	0.143	0.148	0.150	0.155
2036	0.104	0.120	0.125	0.131	0.138	0.143	0.148	0.150	0.155
2037	0.106	0.121	0.125	0.132	0.138	0.143	0.148	0.150	0.155
2038	0.106	0.121	0.126	0.132	0.138	0.143	0.148	0.151	0.155
2039	0.107	0.122	0.126	0.132	0.138	0.144	0.148	0.151	0.155
2040	0.109	0.122	0.126	0.132	0.138	0.144	0.148	0.151	0.155
2041	0.109	0.123	0.126	0.132	0.138	0.144	0.148	0.151	0.155
2042	0.111	0.123	0.127	0.132	0.138	0.144	0.148	0.151	0.155
2043	0.112	0.123	0.127	0.133	0.139	0.144	0.148	0.151	0.155
2044	0.113	0.124	0.127	0.133	0.139	0.144	0.148	0.151	0.155
2045	0.115	0.124	0.127	0.133	0.138	0.144	0.148	0.151	0.155

2046	0.116	0.124	0.127	0.133	0.139	0.144	0.148	0.151	0.155
2047	0.116	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2048	0.117	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2049	0.117	0.124	0.127	0.133	0.139	0.144	0.148	0.151	0.155
2050	0.117	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2051	0.118	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2052	0.118	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2053	0.118	0.124	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2054	0.119	0.125	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2055	0.118	0.125	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2056	0.118	0.125	0.128	0.133	0.139	0.144	0.148	0.151	0.155
2057	0.119	0.125	0.128	0.133	0.139	0.144	0.148	0.151	0.155

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.177

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.372
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	29.113	4.847
2009	33.959	7.096

2010	39.516	9.065
2011	44.609	10.387
2012	48.863	11.511
2013	53.592	13.868
2014	57.926	18.171
2015	63.534	23.902
2016	70.251	30.398
2017	77.908	37.184
2018	86.621	43.282
2019	96.175	48.845
2020	106.179	53.662
2021	116.302	57.546
2022	126.240	60.404
2023	135.809	62.324
2024	144.815	63.372
2025	153.146	63.663
2026	160.703	63.331
2027	167.471	62.455
2028	173.494	61.131
2029	178.796	59.440
2030	183.476	57.525
2031	187.545	55.514
2032	191.094	53.489
2033	194.270	51.472
2034	197.141	49.535
2035	199.689	47.678
2036	201.874	45.952
2037	203.717	44.318
2038	205.243	42.751
2039	206.580	41.261
2040	207.759	39.826
2041	208.796	38.464
2042	209.715	37.167
2043	210.477	36.012
2044	211.167	35.001
2045	211.764	34.096
2046	212.295	33.240
2047	212.750	32.468
2048	213.152	31.751
2049	213.512	31.108
2050	213.863	30.614
2051	214.193	30.251
2052	214.448	29.925
2053	214.731	29.615
2054	215.021	29.325
2055	215.239	29.061
2056	215.400	28.839
2057	215.515	28.711

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	19.707	21.768	22.992	25.598	28.658	32.349	35.582	37.765	41.058
2009	20.789	23.892	25.399	28.764	33.427	38.209	43.433	46.649	51.376
2010	24.043	27.488	29.357	33.114	38.486	44.308	50.831	55.292	65.415
2011	27.283	31.155	33.470	37.714	43.254	49.639	56.693	61.805	78.390
2012	30.424	34.584	37.043	41.572	47.319	53.722	60.880	68.974	91.453
2013	33.515	38.020	40.648	45.395	51.171	57.589	68.001	79.930	109.780
2014	35.461	40.153	42.851	47.647	53.448	60.817	78.204	96.563	131.088
2015	37.530	42.164	44.946	49.726	55.740	67.019	95.429	118.829	154.540
2016	38.797	43.714	46.569	51.379	58.076	77.331	117.363	140.139	174.622
2017	39.567	44.584	47.463	52.572	60.853	93.577	138.183	159.889	192.330
2018	40.265	45.451	48.357	53.842	66.649	113.494	156.439	175.637	206.773
2019	40.671	46.119	49.188	55.087	76.789	133.019	172.176	189.848	220.084
2020	41.229	46.632	49.842	56.523	92.971	149.941	184.973	201.663	230.024
2021	41.802	47.249	50.543	58.256	112.145	164.430	196.210	212.630	240.369
2022	42.140	47.793	51.357	61.098	129.847	177.021	205.728	221.382	246.791
2023	42.738	48.342	52.308	67.051	145.728	187.266	213.727	229.016	253.112
2024	43.042	48.917	53.266	77.530	159.001	195.717	220.710	234.847	258.481
2025	43.148	49.767	54.451	94.602	169.645	202.503	226.626	239.395	264.210
2026	43.459	50.671	55.689	114.167	178.247	208.276	231.043	243.683	268.015
2027	44.021	51.512	57.158	131.713	184.534	212.747	233.940	247.794	271.998

2028	44.854	52.337	59.341	146.081	189.439	215.927	237.551	250.803	274.591
2029	45.315	53.083	63.359	156.963	193.923	218.563	240.460	253.343	276.097
2030	45.863	54.233	71.325	164.646	197.289	221.039	242.001	254.798	277.223
2031	45.974	55.636	83.676	170.992	199.769	223.134	243.344	255.700	277.638
2032	46.792	57.396	101.878	175.670	201.942	224.919	244.540	256.588	278.141
2033	47.517	59.601	121.253	179.462	203.784	226.093	245.699	257.222	278.449
2034	48.216	63.801	137.083	182.137	205.683	227.133	246.957	258.004	279.369
2035	48.805	71.654	149.021	184.469	207.187	228.484	247.494	258.728	280.350
2036	49.517	85.143	157.733	186.397	208.292	229.516	248.214	259.730	281.680
2037	50.220	103.880	163.198	187.887	209.236	230.194	248.974	260.432	282.555
2038	51.371	122.027	166.473	189.324	209.955	230.293	249.090	261.001	282.125
2039	52.266	136.110	168.749	190.232	210.679	230.594	249.648	261.815	283.056
2040	53.091	145.742	170.748	191.190	211.040	231.061	250.040	261.551	282.802
2041	54.041	153.399	172.439	192.071	211.449	231.790	250.414	261.216	282.688
2042	54.976	158.000	174.082	192.736	211.807	232.086	250.443	261.318	283.416
2043	56.828	161.593	175.237	193.150	212.142	231.875	250.832	261.061	283.137
2044	58.972	164.278	176.034	193.710	212.481	232.160	250.892	261.737	283.514
2045	62.454	165.360	177.290	193.790	212.664	232.337	250.683	262.221	283.238
2046	68.796	166.760	177.869	194.400	212.759	232.460	251.030	261.927	282.576
2047	80.889	167.969	178.434	194.620	212.930	232.689	251.008	261.788	283.356
2048	99.486	168.600	178.969	195.002	213.166	232.871	250.847	261.619	283.257
2049	118.795	169.447	179.401	195.061	213.452	232.903	250.662	261.456	284.105
2050	133.562	170.305	179.704	195.470	213.786	233.098	250.816	261.896	283.346
2051	141.747	170.098	179.905	195.773	213.824	233.140	251.554	262.318	283.938
2052	146.751	170.767	179.853	195.912	213.830	233.529	251.430	262.834	283.222
2053	148.594	171.025	180.458	196.017	213.954	233.482	251.928	262.855	282.827
2054	150.966	171.544	180.937	196.055	214.325	233.695	252.063	262.964	283.409
2055	152.394	172.237	180.931	196.558	214.535	233.765	252.117	263.120	283.250
2056	153.189	172.289	180.961	196.594	214.684	233.999	251.714	263.366	283.586
2057	154.004	172.123	181.031	196.437	214.649	234.100	252.066	263.540	283.550

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 177.905 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.002
2016	0.008
2017	0.023
2018	0.046
2019	0.081
2020	0.123
2021	0.180
2022	0.244
2023	0.314
2024	0.380
2025	0.443
2026	0.502
2027	0.552
2028	0.599
2029	0.641
2030	0.677
2031	0.707
2032	0.734
2033	0.760
2034	0.781
2035	0.799
2036	0.814
2037	0.830
2038	0.843
2039	0.855
2040	0.862
2041	0.871
2042	0.878
2043	0.884
2044	0.889
2045	0.897

2046	0.900
2047	0.904
2048	0.906
2049	0.910
2050	0.911
2051	0.913
2052	0.913
2053	0.916
2054	0.919
2055	0.922
2056	0.920
2057	0.920

Pr(B >= Threshold Value) AT LEAST ONCE:= 0.993

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	6392.607	2875.179
2009	6449.018	2868.250
2010	6770.803	3937.001
2011	7584.736	5678.678
2012	8480.144	7043.007
2013	9912.962	8586.741
2014	11192.472	9466.998
2015	12769.949	10325.156
2016	14191.639	10795.075
2017	15358.171	11159.635
2018	16419.238	11314.856
2019	17192.323	11234.946
2020	18060.025	11316.701
2021	18802.420	11240.406
2022	19250.904	11123.357
2023	19821.489	11083.479
2024	20266.754	10903.093
2025	20524.874	10887.400
2026	20894.760	10666.475
2027	21273.333	10652.245
2028	21360.794	10397.845
2029	21596.649	10389.537
2030	21762.465	10269.194
2031	22090.679	10248.130
2032	22295.118	10242.172
2033	22348.060	10176.175
2034	22428.318	10077.676
2035	22374.901	10027.839
2036	22543.211	9889.708
2037	22605.745	9868.031
2038	22698.920	9860.332
2039	22734.673	9901.550
2040	22706.796	9855.022
2041	22954.471	9822.494
2042	22730.806	9674.910
2043	22933.698	9734.352
2044	23012.040	9829.780
2045	22824.429	9689.584
2046	22915.690	9687.432
2047	23132.083	9835.010
2048	23004.577	9741.785
2049	22974.032	9675.085
2050	23073.433	9698.141
2051	23150.657	9776.405
2052	23141.692	9726.500
2053	23093.065	9749.133
2054	23061.907	9663.397
2055	23089.362	9694.436
2056	23073.866	9658.112
2057	23177.915	9692.791

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1589.497	2058.934	2395.419	4153.823	6392.871	8169.989	10708.147	11115.869	12012.263
2009	1591.720	2100.860	2422.323	4191.920	6415.381	8245.684	10725.395	11203.687	12002.134
2010	1591.094	2101.032	2418.840	4198.510	6448.074	8664.738	10758.205	11545.362	22057.941
2011	1596.919	2160.852	2442.627	4285.485	6499.762	9905.437	11297.819	17895.718	30519.853
2012	1612.406	2220.541	2467.875	4416.617	6593.475	10342.964	15172.573	24315.813	44513.689
2013	1616.407	2231.272	2490.584	4751.673	6830.249	10757.049	22159.098	28648.083	45113.151
2014	1641.237	2311.291	2729.255	5259.590	7236.023	11930.173	25384.152	28955.498	45263.952
2015	1659.234	2344.465	3096.482	5994.064	9760.350	18846.515	27557.825	33664.507	45434.810
2016	1736.437	2388.970	3634.550	6337.864	10472.526	19969.901	28762.927	37612.225	45442.724
2017	1731.427	2423.845	3968.205	6487.566	10838.041	22725.527	28882.800	41406.767	45555.354
2018	1784.294	2509.481	4147.148	6800.874	12165.755	24018.471	28978.358	43731.349	45577.089
2019	1800.487	2736.376	4394.560	7284.936	17438.209	24791.041	28999.518	44433.143	45632.170
2020	1870.619	3125.511	4940.396	9704.428	17878.944	25279.383	31277.676	44639.948	45642.673
2021	1961.212	3734.624	5617.873	10003.074	18431.896	25542.391	32708.092	44698.570	45615.969
2022	1964.415	3998.158	6143.297	10199.111	18817.755	25711.426	33922.326	44714.864	45656.652
2023	2096.930	4154.768	6406.451	10549.648	19571.521	25877.622	35347.092	44864.955	45699.188
2024	2237.995	4418.972	6595.671	10723.426	19807.105	26158.992	35662.949	44802.484	45696.090
2025	2240.576	4844.349	6883.116	10854.885	19814.552	26346.504	36947.788	44860.762	45671.087
2026	2308.795	5658.913	8115.027	11183.887	19827.078	26541.239	36589.951	44807.708	45691.167
2027	2397.955	6214.348	9699.673	11676.830	19839.869	26806.191	38015.587	44938.485	45690.760
2028	2437.143	6458.797	9817.592	12222.525	19843.101	26798.979	36886.178	44864.017	45662.473
2029	2458.050	6602.219	9859.623	13143.684	19852.372	27122.284	37597.466	44888.056	45667.101
2030	2640.590	6984.020	9933.271	14191.928	19856.205	27111.995	37642.551	44914.644	45694.664
2031	2741.544	9274.836	10020.608	15084.342	20211.547	27311.613	38578.260	44916.977	45706.916
2032	3359.428	9654.116	10065.148	15802.799	20475.335	27668.793	39021.254	44917.585	45709.979
2033	3926.607	9698.379	10098.819	16350.506	20303.646	27592.715	39523.166	44958.009	45713.305
2034	4116.051	9748.638	10124.167	16716.820	20594.171	27458.469	39053.978	44958.885	45709.783
2035	4399.834	9763.397	10142.954	16633.968	20365.905	27511.347	38801.800	44998.018	45698.419
2036	4643.423	9789.106	10193.597	17526.276	20808.730	27552.136	38667.383	44925.419	45699.350
2037	5713.346	9825.050	10236.931	17696.277	20794.668	27696.822	38822.091	44941.220	45708.724
2038	6003.056	9838.734	10264.273	17848.760	21001.575	27845.286	38736.623	44940.386	45705.707
2039	6321.886	9884.188	10303.401	17849.075	20654.745	27796.388	39546.131	44999.279	45713.008
2040	6503.946	9886.653	10324.597	17781.278	20822.239	27719.384	39316.246	44944.544	45695.081
2041	7080.608	9914.441	10371.053	17854.951	21334.269	27862.955	39522.889	45034.077	45711.727
2042	7237.567	9916.316	10370.823	17853.342	21095.847	27649.814	38379.357	44893.856	45685.744
2043	9620.256	9942.451	10426.781	17857.028	21211.585	27827.725	39146.220	45029.553	45730.650
2044	9636.588	9941.552	10453.459	17856.890	21059.965	27999.446	40315.778	45035.931	45711.200
2045	9635.426	9926.991	10411.711	17855.228	20896.456	27687.219	38846.839	44945.405	45718.958
2046	9652.491	9960.447	10388.269	17855.184	21317.293	27880.537	38840.432	44964.459	45704.700
2047	9660.032	9977.539	10471.989	17857.398	21433.079	28199.477	40619.111	45038.166	45704.660
2048	9662.726	9972.025	10439.971	17855.753	21362.774	27985.204	39685.534	44946.265	45714.200
2049	9658.467	9967.005	10478.249	17859.356	21248.714	27802.283	39555.046	44964.187	45685.830
2050	9665.742	9958.874	10452.610	17860.870	21288.323	27998.561	39742.563	44954.119	45693.098
2051	9674.375	9974.945	10479.519	17858.255	21426.319	28057.609	40251.992	44985.982	45716.169
2052	9676.182	9965.343	10518.249	17861.658	21374.004	28067.669	40044.854	44995.307	45718.380
2053	9682.891	9982.189	10483.169	17858.874	21324.280	28052.128	40024.236	45024.906	45720.519
2054	9669.569	9979.730	10527.546	17858.550	21468.524	27999.708	39446.485	44968.198	45680.375
2055	9677.917	9987.208	10514.417	17860.634	21219.238	28029.689	39841.501	45003.039	45707.382
2056	9681.360	9994.465	10517.820	17861.543	21282.873	27970.353	39452.803	44988.951	45701.619
2057	9679.726	9991.410	10548.363	17862.299	21479.519	28131.061	40072.288	44988.197	45700.637

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	5.134	0.000
2009	4.614	0.906
2010	4.908	1.052
2011	5.800	1.419
2012	6.437	1.591
2013	7.057	1.628
2014	7.548	1.960
2015	8.165	2.606
2016	8.923	3.471
2017	9.826	4.467
2018	10.918	5.426
2019	12.180	6.327
2020	13.569	7.135
2021	15.014	7.811
2022	16.449	8.326
2023	17.841	8.684

2024	19.161	8.899
2025	20.391	8.997
2026	21.509	8.991
2027	22.512	8.901
2028	23.406	8.749
2029	24.188	8.539
2030	24.882	8.285
2031	25.493	8.003
2032	26.017	7.714
2033	26.470	7.428
2034	26.880	7.153
2035	27.255	6.887
2036	27.594	6.638
2037	27.882	6.408
2038	28.114	6.192
2039	28.309	5.983
2040	28.477	5.785
2041	28.631	5.597
2042	28.764	5.415
2043	28.877	5.243
2044	28.979	5.090
2045	29.066	4.966
2046	29.145	4.849
2047	29.214	4.739
2048	29.278	4.640
2049	29.322	4.546
2050	29.367	4.458
2051	29.423	4.400
2052	29.462	4.363
2053	29.493	4.320
2054	29.532	4.284
2055	29.572	4.251
2056	29.605	4.211
2057	29.626	4.182

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	5.134	5.134	5.134	5.134	5.134	5.134	5.134	5.134	5.134
2009	2.867	3.255	3.474	3.928	4.539	5.232	5.792	6.179	6.894
2010	2.961	3.414	3.623	4.128	4.812	5.548	6.315	6.774	7.526
2011	3.439	3.951	4.236	4.807	5.616	6.532	7.557	8.257	9.949
2012	3.842	4.410	4.752	5.389	6.214	7.191	8.296	9.138	11.456
2013	4.327	4.942	5.322	6.001	6.864	7.806	8.843	9.778	12.812
2014	4.637	5.295	5.679	6.382	7.232	8.179	9.480	11.038	15.629
2015	4.937	5.612	6.009	6.711	7.565	8.646	10.797	13.582	18.958
2016	5.160	5.844	6.252	6.946	7.849	9.293	13.342	17.060	22.502
2017	5.270	5.984	6.396	7.107	8.114	10.577	16.763	20.284	25.360
2018	5.357	6.103	6.517	7.274	8.500	13.068	19.805	23.011	27.627
2019	5.454	6.194	6.631	7.456	9.152	16.191	22.432	25.196	29.748
2020	5.475	6.275	6.735	7.638	10.462	19.045	24.587	27.166	31.567
2021	5.553	6.354	6.833	7.849	12.980	21.458	26.423	28.829	32.958
2022	5.623	6.443	6.943	8.111	15.976	23.479	27.948	30.293	34.159
2023	5.695	6.526	7.055	8.496	18.559	25.133	29.205	31.404	35.067
2024	5.770	6.611	7.203	9.184	20.763	26.438	30.173	32.372	35.810
2025	5.840	6.704	7.363	10.600	22.542	27.536	31.087	33.068	36.567
2026	5.847	6.829	7.532	13.239	23.890	28.383	31.816	33.702	37.226
2027	5.891	6.954	7.710	16.266	24.945	29.107	32.354	34.201	37.788
2028	5.977	7.077	7.944	18.739	25.715	29.652	32.773	34.724	38.301
2029	6.071	7.207	8.276	20.670	26.312	30.057	33.204	35.043	38.646
2030	6.191	7.314	8.758	21.968	26.846	30.357	33.550	35.381	38.775
2031	6.239	7.505	9.737	22.952	27.258	30.663	33.697	35.552	38.730
2032	6.256	7.722	11.604	23.675	27.574	30.941	33.865	35.631	38.886
2033	6.372	7.987	14.393	24.200	27.863	31.160	33.970	35.699	38.898
2034	6.503	8.276	17.308	24.665	28.087	31.311	34.126	35.874	38.901
2035	6.613	8.835	19.430	25.022	28.327	31.438	34.330	35.985	39.046
2036	6.688	9.772	20.924	25.340	28.519	31.607	34.370	36.012	39.260
2037	6.784	11.688	21.843	25.568	28.670	31.748	34.506	36.147	39.358
2038	6.901	14.669	22.373	25.760	28.798	31.799	34.585	36.299	39.492
2039	7.046	17.358	22.773	25.922	28.874	31.829	34.642	36.341	39.572
2040	7.157	19.106	23.075	26.055	28.968	31.884	34.642	36.429	39.570
2041	7.314	20.229	23.333	26.135	29.020	31.939	34.729	36.377	39.587

2042	7.476	21.112	23.527	26.262	29.059	31.997	34.746	36.367	39.621
2043	7.606	21.571	23.727	26.340	29.083	32.047	34.733	36.374	39.560
2044	7.902	21.991	23.900	26.409	29.164	32.028	34.812	36.339	39.578
2045	8.244	22.289	23.977	26.478	29.193	32.070	34.825	36.390	39.647
2046	8.733	22.506	24.144	26.509	29.210	32.092	34.832	36.457	39.566
2047	9.460	22.682	24.198	26.548	29.237	32.146	34.812	36.439	39.483
2048	11.080	22.809	24.272	26.602	29.260	32.141	34.849	36.414	39.525
2049	13.962	22.911	24.348	26.632	29.282	32.150	34.805	36.377	39.592
2050	16.813	23.020	24.421	26.674	29.360	32.151	34.779	36.385	39.693
2051	18.499	23.115	24.402	26.720	29.359	32.199	34.816	36.399	39.533
2052	19.409	23.125	24.444	26.733	29.383	32.203	34.896	36.496	39.699
2053	20.039	23.178	24.485	26.753	29.359	32.223	34.909	36.593	39.615
2054	20.229	23.215	24.511	26.778	29.385	32.232	34.981	36.570	39.550
2055	20.441	23.291	24.574	26.806	29.449	32.290	34.995	36.595	39.712
2056	20.639	23.323	24.616	26.828	29.463	32.306	35.013	36.614	39.585
2057	20.731	23.331	24.592	26.839	29.483	32.323	34.972	36.649	39.620

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	977.	1543.	1954.	3134.	5020.	8299.	13428.	17294.	28705.
2	2419.	3052.	3484.	4326.	5817.	7752.	9918.	11538.	15055.
3	1957.	2352.	2596.	3122.	3861.	4737.	5739.	6410.	7942.
4	494.	579.	653.	789.	951.	1174.	1395.	1599.	1875.
5	1557.	1852.	2031.	2413.	2947.	3500.	4074.	4548.	5590.
6	77.	98.	108.	128.	159.	192.	229.	255.	320.
7	83.	118.	138.	182.	237.	304.	379.	428.	541.
8	24.	37.	44.	60.	80.	106.	130.	151.	196.
9	14.	17.	19.	22.	26.	30.	34.	37.	41.
10+	12.	15.	16.	19.	22.	26.	30.	33.	37.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	9681.	9994.	10518.	17862.	21283.	27970.	39453.	44989.	45702.
2	7909.	8162.	8593.	14596.	17341.	22906.	32559.	36777.	37353.
3	6351.	6555.	6915.	11730.	14101.	18391.	25909.	29536.	30004.
4	4845.	4994.	5245.	8935.	10669.	14035.	20025.	22527.	22875.
5	3457.	3560.	3757.	6381.	7635.	10026.	14305.	16073.	16332.
6	2352.	2425.	2547.	4341.	5208.	6820.	9784.	10935.	11112.
7	1599.	1647.	1729.	2954.	3521.	4631.	6573.	7435.	7558.
8	1087.	1122.	1179.	2010.	2391.	3129.	4452.	5061.	5142.
9	740.	764.	800.	1367.	1636.	2143.	3039.	3442.	3501.
10+	2205.	2690.	2905.	3263.	3692.	4194.	4702.	4992.	5533.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.311	0.061
2009	0.222	0.000
2010	0.185	0.000
2011	0.185	0.000
2012	0.185	0.000
2013	0.185	0.000
2014	0.185	0.000
2015	0.185	0.000
2016	0.185	0.000
2017	0.185	0.000
2018	0.185	0.000
2019	0.185	0.000
2020	0.185	0.000
2021	0.185	0.000
2022	0.185	0.000
2023	0.185	0.000
2024	0.185	0.000
2025	0.185	0.000
2026	0.185	0.000
2027	0.185	0.000
2028	0.185	0.000
2029	0.185	0.000
2030	0.185	0.000
2031	0.185	0.000
2032	0.185	0.000
2033	0.185	0.000

2034	0.185	0.000
2035	0.185	0.000
2036	0.185	0.000
2037	0.185	0.000
2038	0.185	0.000
2039	0.185	0.000
2040	0.185	0.000
2041	0.185	0.000
2042	0.185	0.000
2043	0.185	0.000
2044	0.185	0.000
2045	0.185	0.000
2046	0.185	0.000
2047	0.185	0.000
2048	0.185	0.000
2049	0.185	0.000
2050	0.185	0.000
2051	0.185	0.000
2052	0.185	0.000
2053	0.185	0.000
2054	0.185	0.000
2055	0.185	0.000
2056	0.185	0.000
2057	0.185	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.192	0.222	0.238	0.267	0.304	0.349	0.393	0.422	0.467
2009	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222
2010	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2011	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2012	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2013	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2014	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2015	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2016	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2017	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2018	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2019	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2020	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2021	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2022	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2023	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2024	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2025	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2026	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2027	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2028	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2029	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2030	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2031	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2032	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2033	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2034	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2035	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2036	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2037	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2038	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2039	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2040	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2041	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2042	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2043	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2044	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2045	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2046	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2047	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2048	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2049	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2050	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2051	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185

2052	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2053	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2054	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2055	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2056	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
2057	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.250

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.854
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

Gulf of Maine Cod

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 GoM Cod CDF Model 14 - F40% from YPR

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\FGMCOD\F_GMCOD_NEWEST08CAT_75%FMSY_INTERI
 M09.IN


 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\FGMCOD\F_GMCOD_NEWEST08CAT_75%FMSY_INTERI
 M09.OUT


 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:          100
 TOTAL NUMBER OF SIMULATIONS:       100000
 NUMBER OF FEASIBLE SIMULATIONS:       100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             8.499
 2009  0.263
 2010  0.178
 2011  0.178
 2012  0.178
 2013  0.178
 2014  0.178
 2015  0.178
 2016  0.178
 2017  0.178
 2018  0.178
 2019  0.178
 2020  0.178
 2021  0.178
 2022  0.178
 2023  0.178
 2024  0.178
 2025  0.178
 2026  0.178
 2027  0.178
 2028  0.178
 2029  0.178
 2030  0.178
 2031  0.178
 2032  0.178
 2033  0.178
 2034  0.178
 2035  0.178
 2036  0.178
 2037  0.178
 2038  0.178
 2039  0.178
 2040  0.178
 2041  0.178
 2042  0.178
 2043  0.178
 2044  0.178
 2045  0.178
 2046  0.178
 2047  0.178
 2048  0.178
 2049  0.178
 2050  0.178
 2051  0.178
 2052  0.178
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2053	0.178
2054	0.178
2055	0.178
2056	0.178
2057	0.178

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	46.948	9.370
2009	56.850	13.571
2010	60.221	13.781
2011	63.529	13.398
2012	67.726	13.777
2013	70.758	14.277
2014	74.474	14.903
2015	75.139	14.969
2016	76.021	15.060
2017	74.774	14.972
2018	74.037	14.958
2019	73.624	15.061
2020	73.323	15.098
2021	73.107	15.117
2022	72.938	15.119
2023	72.824	15.124
2024	72.750	15.133
2025	72.696	15.135
2026	72.663	15.134
2027	72.643	15.135
2028	72.628	15.131
2029	72.609	15.139
2030	72.601	15.160
2031	72.600	15.177
2032	72.578	15.161
2033	72.540	15.118
2034	72.506	15.086
2035	72.481	15.077
2036	72.459	15.071
2037	72.443	15.055
2038	72.429	15.045
2039	72.418	15.054
2040	72.416	15.074
2041	72.419	15.089
2042	72.416	15.089
2043	72.422	15.109
2044	72.428	15.132
2045	72.423	15.129
2046	72.434	15.111
2047	72.443	15.105
2048	72.447	15.103
2049	72.443	15.097
2050	72.444	15.080
2051	72.430	15.072
2052	72.415	15.061
2053	72.394	15.046
2054	72.393	15.032
2055	72.407	15.021
2056	72.432	15.011
2057	72.445	15.017

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	28.927	33.335	35.727	40.585	45.979	52.358	59.367	64.669	74.279
2009	32.114	37.780	41.121	47.285	55.305	64.546	74.170	83.297	96.941
2010	35.555	41.150	44.622	50.405	58.455	68.068	77.979	85.828	101.792
2011	39.433	44.923	48.077	54.000	61.744	71.243	81.201	88.060	103.326
2012	42.749	48.458	51.677	57.892	65.921	75.766	86.221	93.100	107.039
2013	45.025	50.748	54.117	60.498	68.860	79.224	90.033	97.098	111.215
2014	47.471	53.450	57.022	63.696	72.585	83.426	94.564	101.819	116.406
2015	48.117	54.094	57.640	64.232	73.194	84.158	95.323	102.593	117.068
2016	48.740	54.775	58.393	65.048	74.109	85.151	96.387	103.572	117.861
2017	47.775	53.760	57.222	63.829	72.881	83.882	95.062	102.208	116.175

2018	46.987	53.086	56.500	63.042	72.134	83.109	94.365	101.371	115.702
2019	46.372	52.434	55.955	62.592	71.690	82.796	93.925	101.118	115.636
2020	45.986	52.047	55.639	62.229	71.426	82.571	93.662	100.841	115.188
2021	45.691	51.784	55.396	62.048	71.211	82.323	93.415	100.763	115.174
2022	45.546	51.613	55.151	61.916	71.036	82.150	93.272	100.577	114.996
2023	45.372	51.436	54.989	61.790	70.935	82.015	93.250	100.441	114.933
2024	45.376	51.292	54.947	61.700	70.849	81.984	93.166	100.380	114.660
2025	45.218	51.315	54.900	61.642	70.772	81.973	93.197	100.301	114.756
2026	45.225	51.329	54.903	61.617	70.746	81.894	93.117	100.423	114.712
2027	45.211	51.339	54.913	61.541	70.754	81.863	93.097	100.216	114.662
2028	45.252	51.252	54.874	61.493	70.736	81.881	93.162	100.377	114.483
2029	45.190	51.271	54.747	61.533	70.725	81.934	93.188	100.378	114.437
2030	45.092	51.220	54.724	61.516	70.704	81.873	93.206	100.417	114.473
2031	45.061	51.186	54.713	61.449	70.696	81.894	93.153	100.445	114.921
2032	45.089	51.209	54.726	61.517	70.690	81.891	93.098	100.150	114.793
2033	45.148	51.190	54.676	61.476	70.664	81.871	92.998	99.950	114.500
2034	45.149	51.162	54.700	61.484	70.655	81.813	92.882	100.076	114.075
2035	45.178	51.170	54.726	61.406	70.617	81.709	92.939	100.101	114.089
2036	45.104	51.167	54.708	61.407	70.609	81.659	92.920	100.007	114.020
2037	45.096	51.174	54.690	61.385	70.609	81.663	92.856	100.114	113.687
2038	45.205	51.147	54.621	61.361	70.572	81.659	92.860	100.038	113.803
2039	45.121	51.091	54.648	61.370	70.604	81.640	92.781	99.866	114.049
2040	45.030	51.100	54.572	61.367	70.559	81.704	92.800	99.937	113.851
2041	45.133	51.093	54.629	61.367	70.581	81.672	92.811	100.012	114.130
2042	45.002	51.022	54.621	61.354	70.592	81.662	92.770	100.010	114.130
2043	44.933	51.015	54.622	61.382	70.553	81.681	92.893	100.037	114.253
2044	44.911	51.076	54.673	61.329	70.569	81.683	92.835	100.033	114.322
2045	44.923	51.060	54.684	61.314	70.544	81.734	92.789	99.998	114.410
2046	44.996	51.134	54.663	61.329	70.568	81.766	92.711	99.961	114.249
2047	44.941	51.089	54.650	61.389	70.618	81.796	92.737	99.955	114.309
2048	44.996	51.096	54.630	61.390	70.650	81.674	92.775	99.920	114.289
2049	45.024	51.048	54.646	61.426	70.619	81.701	92.760	99.780	114.367
2050	44.981	51.033	54.700	61.453	70.615	81.643	92.710	99.896	114.341
2051	44.941	51.053	54.704	61.421	70.628	81.674	92.678	100.013	114.145
2052	45.000	51.045	54.679	61.369	70.565	81.646	92.728	99.938	113.907
2053	45.022	51.009	54.707	61.419	70.570	81.605	92.678	99.831	113.810
2054	45.032	51.095	54.741	61.408	70.547	81.600	92.675	99.704	113.881
2055	45.125	51.176	54.714	61.430	70.519	81.640	92.709	99.903	113.901
2056	45.146	51.201	54.762	61.425	70.609	81.644	92.708	99.963	113.790
2057	45.184	51.183	54.694	61.446	70.622	81.711	92.809	99.965	113.499

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 58.248 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.109
2009	0.405
2010	0.507
2011	0.616
2012	0.739
2013	0.810
2014	0.877
2015	0.889
2016	0.903
2017	0.881
2018	0.867
2019	0.855
2020	0.848
2021	0.843
2022	0.839
2023	0.837
2024	0.835
2025	0.834
2026	0.833
2027	0.831
2028	0.832
2029	0.830
2030	0.830
2031	0.830
2032	0.829
2033	0.829
2034	0.828
2035	0.829

2036	0.828
2037	0.828
2038	0.828
2039	0.827
2040	0.826
2041	0.826
2042	0.827
2043	0.827
2044	0.827
2045	0.827
2046	0.828
2047	0.828
2048	0.827
2049	0.828
2050	0.829
2051	0.828
2052	0.829
2053	0.829
2054	0.829
2055	0.829
2056	0.828
2057	0.828

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 11

YEAR	AVG MEAN B (000 MT)	STD
2008	71.918	16.365
2009	74.533	16.425
2010	76.835	16.292
2011	80.124	16.430
2012	84.441	17.136
2013	87.307	17.563
2014	90.114	17.933
2015	90.691	17.996
2016	90.602	17.973
2017	89.583	17.943
2018	88.971	17.974
2019	88.600	18.027
2020	88.323	18.058
2021	88.107	18.062
2022	87.972	18.077
2023	87.876	18.089
2024	87.802	18.088
2025	87.771	18.092
2026	87.743	18.088
2027	87.722	18.088
2028	87.691	18.102
2029	87.694	18.135
2030	87.686	18.142
2031	87.638	18.094
2032	87.599	18.043
2033	87.560	18.024
2034	87.536	18.016
2035	87.506	18.005
2036	87.497	17.986
2037	87.479	17.986
2038	87.466	17.998
2039	87.476	18.037
2040	87.466	18.027
2041	87.462	18.035
2042	87.476	18.076
2043	87.474	18.084
2044	87.464	18.065
2045	87.495	18.056
2046	87.494	18.051
2047	87.496	18.049
2048	87.494	18.033
2049	87.496	18.020
2050	87.469	18.008

2051	87.451	17.994
2052	87.429	17.971
2053	87.437	17.965
2054	87.465	17.954
2055	87.491	17.937
2056	87.505	17.962
2057	87.508	18.006

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	42.001	49.187	53.471	60.290	69.915	81.227	93.133	102.659	120.940
2009	45.136	51.867	55.857	62.838	72.406	83.872	95.805	104.902	123.798
2010	47.572	54.275	58.023	65.196	74.614	86.214	98.549	106.895	124.311
2011	50.623	57.212	61.091	68.342	77.900	89.794	102.336	110.516	126.895
2012	53.613	60.449	64.448	72.083	82.116	94.681	107.628	116.068	133.060
2013	55.636	62.621	66.836	74.584	84.981	97.896	110.968	119.524	136.704
2014	57.706	64.848	69.159	77.039	87.802	100.956	114.335	122.983	140.319
2015	58.123	65.314	69.623	77.587	88.345	101.622	115.064	123.632	140.420
2016	58.033	65.270	69.492	77.461	88.373	101.549	114.934	123.417	140.301
2017	57.037	64.357	68.511	76.406	87.299	100.542	113.936	122.213	139.556
2018	56.340	63.586	67.899	75.819	86.657	99.976	113.132	121.699	139.003
2019	55.878	63.138	67.468	75.391	86.373	99.636	112.902	121.515	138.452
2020	55.526	62.805	67.097	75.130	86.046	99.364	112.591	121.358	138.461
2021	55.177	62.597	66.791	74.923	85.904	99.124	112.445	121.232	138.334
2022	55.239	62.352	66.650	74.797	85.734	98.996	112.387	120.977	138.079
2023	55.050	62.261	66.629	74.690	85.587	98.954	112.209	121.023	137.877
2024	54.924	62.243	66.550	74.582	85.523	98.883	112.300	120.774	137.983
2025	54.822	62.205	66.541	74.548	85.515	98.851	112.298	120.811	137.842
2026	54.797	62.258	66.555	74.467	85.493	98.822	112.257	120.744	137.961
2027	54.912	62.093	66.440	74.456	85.474	98.784	112.268	120.845	137.581
2028	54.701	62.152	66.294	74.452	85.473	98.782	112.285	120.861	137.850
2029	54.715	62.087	66.323	74.449	85.444	98.799	112.372	120.940	137.857
2030	54.734	62.030	66.303	74.392	85.412	98.801	112.259	120.746	138.034
2031	54.727	62.084	66.311	74.423	85.410	98.774	112.053	120.529	137.916
2032	54.955	62.055	66.221	74.413	85.365	98.747	111.945	120.416	137.392
2033	54.761	62.006	66.297	74.386	85.374	98.679	111.942	120.536	137.481
2034	54.765	62.044	66.305	74.316	85.364	98.583	111.934	120.462	137.301
2035	54.786	62.041	66.272	74.301	85.323	98.526	111.911	120.656	137.242
2036	54.761	62.018	66.255	74.292	85.330	98.531	111.978	120.536	136.829
2037	54.779	61.981	66.213	74.251	85.281	98.645	111.901	120.228	136.917
2038	54.782	61.938	66.199	74.265	85.288	98.554	111.747	120.289	137.254
2039	54.733	61.975	66.095	74.251	85.275	98.561	111.853	120.394	137.169
2040	54.673	61.931	66.195	74.289	85.284	98.554	111.788	120.418	137.285
2041	54.669	61.846	66.162	74.265	85.240	98.496	111.757	120.481	137.367
2042	54.551	61.924	66.173	74.253	85.258	98.588	111.900	120.473	137.414
2043	54.561	61.906	66.269	74.235	85.248	98.547	111.850	120.490	137.757
2044	54.565	61.941	66.237	74.251	85.278	98.633	111.706	120.430	137.670
2045	54.576	61.996	66.216	74.241	85.282	98.621	111.809	120.379	137.473
2046	54.565	61.943	66.200	74.301	85.319	98.583	111.713	120.292	137.463
2047	54.619	61.864	66.165	74.287	85.379	98.585	111.823	120.189	137.646
2048	54.658	61.868	66.195	74.342	85.322	98.522	111.798	120.181	137.731
2049	54.510	61.887	66.271	74.368	85.333	98.499	111.628	120.339	137.465
2050	54.635	61.907	66.251	74.321	85.342	98.472	111.704	120.368	137.132
2051	54.616	61.899	66.224	74.290	85.276	98.447	111.723	120.249	137.087
2052	54.581	61.882	66.260	74.337	85.207	98.467	111.632	120.123	137.074
2053	54.668	61.976	66.344	74.299	85.221	98.399	111.675	120.137	137.175
2054	54.784	62.062	66.282	74.350	85.229	98.497	111.742	120.301	137.063
2055	54.857	62.066	66.328	74.326	85.267	98.536	111.726	120.339	136.852
2056	54.842	62.021	66.281	74.352	85.347	98.535	111.918	120.417	136.391
2057	54.751	61.997	66.284	74.341	85.321	98.581	111.986	120.369	136.671

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 72.738 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.415
2009	0.491
2010	0.550
2011	0.636
2012	0.735
2013	0.791
2014	0.840
2015	0.848

2016	0.847
2017	0.828
2018	0.816
2019	0.806
2020	0.801
2021	0.797
2022	0.794
2023	0.792
2024	0.790
2025	0.789
2026	0.787
2027	0.787
2028	0.786
2029	0.786
2030	0.786
2031	0.786
2032	0.785
2033	0.785
2034	0.785
2035	0.783
2036	0.784
2037	0.783
2038	0.783
2039	0.783
2040	0.783
2041	0.782
2042	0.783
2043	0.782
2044	0.783
2045	0.782
2046	0.783
2047	0.784
2048	0.784
2049	0.785
2050	0.784
2051	0.784
2052	0.784
2053	0.784
2054	0.784
2055	0.784
2056	0.784
2057	0.784

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 11

YEAR	AVG F_WT_B	STD
2008	0.124	0.027
2009	0.155	0.012
2010	0.115	0.012
2011	0.117	0.014
2012	0.111	0.012
2013	0.109	0.011
2014	0.111	0.012
2015	0.111	0.012
2016	0.111	0.012
2017	0.110	0.012
2018	0.110	0.012
2019	0.110	0.012
2020	0.110	0.012
2021	0.110	0.012
2022	0.110	0.012
2023	0.110	0.012
2024	0.110	0.012
2025	0.110	0.012
2026	0.110	0.012
2027	0.110	0.012
2028	0.110	0.012
2029	0.110	0.012
2030	0.110	0.012

2031	0.110	0.012
2032	0.110	0.012
2033	0.110	0.012
2034	0.110	0.012
2035	0.110	0.012
2036	0.110	0.012
2037	0.110	0.012
2038	0.110	0.012
2039	0.110	0.012
2040	0.110	0.012
2041	0.110	0.012
2042	0.110	0.012
2043	0.110	0.012
2044	0.110	0.012
2045	0.110	0.012
2046	0.110	0.012
2047	0.110	0.012
2048	0.110	0.012
2049	0.110	0.012
2050	0.110	0.012
2051	0.110	0.012
2052	0.110	0.012
2053	0.110	0.012
2054	0.110	0.012
2055	0.110	0.012
2056	0.110	0.012
2057	0.110	0.012

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 11

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.070	0.083	0.091	0.105	0.122	0.141	0.159	0.172	0.202
2009	0.123	0.134	0.140	0.149	0.157	0.164	0.169	0.171	0.176
2010	0.079	0.091	0.099	0.108	0.116	0.123	0.128	0.131	0.136
2011	0.079	0.090	0.097	0.108	0.118	0.127	0.134	0.138	0.144
2012	0.078	0.087	0.094	0.104	0.112	0.119	0.125	0.128	0.134
2013	0.077	0.087	0.093	0.102	0.110	0.116	0.122	0.124	0.129
2014	0.079	0.089	0.095	0.104	0.112	0.119	0.125	0.128	0.134
2015	0.079	0.089	0.095	0.104	0.112	0.119	0.124	0.127	0.133
2016	0.079	0.088	0.095	0.104	0.112	0.119	0.124	0.128	0.133
2017	0.078	0.088	0.094	0.103	0.112	0.118	0.124	0.127	0.133
2018	0.078	0.088	0.094	0.103	0.111	0.118	0.124	0.127	0.133
2019	0.078	0.087	0.094	0.103	0.111	0.118	0.124	0.127	0.133
2020	0.078	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2021	0.077	0.087	0.094	0.103	0.111	0.118	0.124	0.127	0.133
2022	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2023	0.077	0.087	0.094	0.103	0.111	0.118	0.124	0.127	0.133
2024	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2025	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2026	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2027	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2028	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2029	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2030	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2031	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2032	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2033	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2034	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2035	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2036	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2037	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2038	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2039	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2040	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2041	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2042	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2043	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2044	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2045	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2046	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2047	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133

2048	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2049	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2050	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2051	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2052	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2053	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2054	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2055	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2056	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133
2057	0.077	0.087	0.093	0.103	0.111	0.118	0.124	0.127	0.133

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.141

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.249
2009	0.886
2010	0.001
2011	0.023
2012	0.001
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.001
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.001
2046	0.000
2047	0.001
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	68.400	14.553
2009	72.578	16.812
2010	73.715	15.767
2011	77.206	15.789

2012	81.578	16.357
2013	84.750	16.875
2014	88.699	17.484
2015	89.388	17.539
2016	90.329	17.623
2017	89.025	17.544
2018	88.250	17.526
2019	87.811	17.616
2020	87.490	17.652
2021	87.254	17.672
2022	87.076	17.675
2023	86.962	17.690
2024	86.882	17.695
2025	86.829	17.692
2026	86.800	17.694
2027	86.776	17.693
2028	86.753	17.699
2029	86.737	17.716
2030	86.731	17.739
2031	86.712	17.731
2032	86.671	17.685
2033	86.629	17.643
2034	86.596	17.623
2035	86.570	17.619
2036	86.550	17.602
2037	86.536	17.590
2038	86.521	17.599
2039	86.516	17.617
2040	86.516	17.638
2041	86.513	17.641
2042	86.514	17.653
2043	86.521	17.682
2044	86.520	17.686
2045	86.523	17.669
2046	86.541	17.658
2047	86.543	17.655
2048	86.544	17.650
2049	86.540	17.636
2050	86.533	17.621
2051	86.509	17.610
2052	86.493	17.592
2053	86.480	17.574
2054	86.497	17.563
2055	86.521	17.551
2056	86.545	17.552
2057	86.551	17.581

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	42.091	47.955	51.342	58.087	66.592	76.512	87.220	96.317	112.274
2009	42.146	49.223	53.523	60.579	70.460	82.126	94.181	104.022	122.700
2010	45.407	51.879	55.595	62.508	71.601	82.759	94.349	102.671	120.909
2011	48.639	55.171	58.854	65.937	75.145	86.344	98.306	106.261	122.836
2012	52.043	58.653	62.520	69.838	79.394	91.277	103.657	111.796	127.899
2013	54.178	61.029	65.024	72.588	82.527	94.873	107.543	115.840	132.420
2014	56.989	64.021	68.233	76.008	86.474	99.244	112.248	120.723	137.538
2015	57.609	64.647	68.842	76.613	87.162	100.015	113.093	121.442	138.096
2016	58.258	65.397	69.614	77.480	88.119	101.061	114.189	122.632	139.075
2017	57.080	64.287	68.387	76.181	86.867	99.688	112.785	120.995	137.736
2018	56.426	63.529	67.663	75.430	86.058	98.967	111.960	120.285	136.998
2019	55.739	62.896	67.094	74.927	85.608	98.620	111.517	119.766	136.767
2020	55.339	62.468	66.768	74.616	85.328	98.303	111.186	119.680	136.331
2021	55.057	62.270	66.433	74.371	85.087	98.045	110.998	119.497	136.282
2022	54.795	62.039	66.172	74.191	84.905	97.836	110.910	119.380	136.241
2023	54.855	61.802	66.063	74.078	84.822	97.753	110.800	119.222	135.915
2024	54.614	61.775	66.066	73.947	84.679	97.716	110.791	119.153	135.873
2025	54.520	61.836	65.985	73.926	84.633	97.660	110.788	119.128	135.851
2026	54.490	61.780	66.010	73.829	84.605	97.603	110.672	119.132	135.799
2027	54.484	61.708	66.010	73.809	84.577	97.619	110.817	119.018	135.783
2028	54.525	61.662	65.875	73.837	84.613	97.644	110.780	119.195	135.521
2029	54.396	61.656	65.814	73.800	84.586	97.574	110.879	119.118	135.533

2030	54.433	61.595	65.793	73.749	84.553	97.563	110.786	119.180	135.849
2031	54.397	61.574	65.802	73.791	84.529	97.602	110.703	118.945	135.890
2032	54.365	61.596	65.741	73.737	84.514	97.578	110.623	118.738	135.664
2033	54.557	61.583	65.735	73.758	84.477	97.532	110.488	118.764	135.342
2034	54.515	61.596	65.740	73.684	84.463	97.441	110.417	118.814	135.179
2035	54.377	61.585	65.766	73.672	84.444	97.329	110.474	118.753	135.225
2036	54.402	61.589	65.774	73.641	84.452	97.323	110.372	118.984	134.958
2037	54.559	61.554	65.730	73.633	84.454	97.342	110.357	118.792	134.764
2038	54.445	61.487	65.694	73.636	84.431	97.368	110.344	118.493	135.006
2039	54.391	61.507	65.656	73.629	84.449	97.366	110.316	118.598	135.301
2040	54.455	61.512	65.630	73.624	84.409	97.379	110.362	118.723	135.150
2041	54.423	61.459	65.653	73.609	84.400	97.371	110.297	118.670	135.242
2042	54.273	61.417	65.665	73.609	84.369	97.343	110.360	118.798	135.145
2043	54.146	61.465	65.687	73.583	84.427	97.368	110.424	118.796	135.383
2044	54.237	61.451	65.753	73.529	84.357	97.383	110.283	118.696	135.378
2045	54.257	61.495	65.715	73.574	84.337	97.442	110.254	118.673	135.339
2046	54.194	61.506	65.704	73.590	84.446	97.498	110.276	118.623	135.448
2047	54.249	61.480	65.642	73.650	84.502	97.368	110.241	118.569	135.386
2048	54.320	61.436	65.701	73.690	84.465	97.430	110.310	118.467	135.289
2049	54.323	61.420	65.743	73.710	84.448	97.321	110.268	118.603	135.475
2050	54.197	61.403	65.741	73.718	84.444	97.339	110.115	118.639	135.189
2051	54.331	61.457	65.714	73.638	84.392	97.263	110.269	118.628	134.947
2052	54.308	61.436	65.743	73.668	84.392	97.292	110.148	118.559	134.687
2053	54.361	61.492	65.751	73.681	84.382	97.278	110.247	118.435	134.904
2054	54.416	61.571	65.826	73.701	84.379	97.278	110.195	118.599	135.037
2055	54.482	61.595	65.797	73.670	84.375	97.296	110.267	118.683	134.726
2056	54.530	61.613	65.736	73.723	84.467	97.343	110.286	118.653	134.587
2057	54.499	61.562	65.755	73.676	84.484	97.407	110.418	118.602	134.448

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 71.768 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.344
2009	0.466
2010	0.495
2011	0.593
2012	0.701
2013	0.769
2014	0.840
2015	0.852
2016	0.865
2017	0.844
2018	0.829
2019	0.818
2020	0.810
2021	0.806
2022	0.802
2023	0.799
2024	0.798
2025	0.797
2026	0.796
2027	0.794
2028	0.794
2029	0.793
2030	0.792
2031	0.793
2032	0.793
2033	0.792
2034	0.792
2035	0.792
2036	0.791
2037	0.791
2038	0.790
2039	0.790
2040	0.789
2041	0.791
2042	0.790
2043	0.790
2044	0.789
2045	0.791
2046	0.791
2047	0.791

2048	0.791
2049	0.792
2050	0.792
2051	0.791
2052	0.791
2053	0.792
2054	0.792
2055	0.791
2056	0.791
2057	0.791

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	7036.199	5098.798
2009	7025.635	5091.735
2010	7050.667	5109.529
2011	7010.721	5074.877
2012	7017.954	5056.002
2013	6995.762	5060.520
2014	7028.281	5086.470
2015	7040.470	5101.212
2016	7025.050	5088.745
2017	7029.249	5083.932
2018	7031.857	5074.511
2019	7005.403	5059.269
2020	7029.685	5086.699
2021	7034.118	5065.291
2022	7013.101	5067.478
2023	7039.601	5104.023
2024	7029.921	5088.824
2025	7035.653	5113.002
2026	7009.632	5061.352
2027	7037.819	5118.924
2028	7041.368	5095.614
2029	6993.167	5050.071
2030	7001.668	5059.972
2031	7000.077	5052.053
2032	7015.091	5075.013
2033	6996.968	5064.994
2034	7017.857	5097.519
2035	7009.106	5102.506
2036	7002.335	5047.952
2037	7030.713	5099.332
2038	7011.339	5041.348
2039	7002.788	5072.127
2040	7025.125	5094.631
2041	7019.540	5075.411
2042	6987.282	5041.982
2043	7043.343	5096.118
2044	7011.340	5090.542
2045	7014.011	5084.032
2046	7006.002	5056.555
2047	7027.291	5073.345
2048	6989.494	5044.438
2049	7005.550	5058.911
2050	6991.903	5040.724
2051	7015.411	5072.872
2052	7030.319	5096.992
2053	7033.587	5088.033
2054	7017.901	5081.771
2055	7022.224	5101.052
2056	6997.821	5054.798
2057	6992.992	5034.536

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%

2008	1098.606	1303.431	2402.471	4048.675	5831.641	7914.535	11912.716	21352.838	24436.024
2009	1097.332	1298.684	2400.262	4046.662	5777.544	7912.688	11919.396	21180.507	24437.320
2010	1096.904	1309.024	2451.359	4050.142	5866.351	7914.766	11914.615	21358.604	24443.640
2011	1096.816	1317.856	2449.813	4043.680	5748.281	7911.385	11832.322	21071.423	24452.127
2012	1098.817	1322.141	2459.321	4046.749	5807.400	7914.729	11824.371	20893.908	24435.129
2013	1097.866	1313.937	2448.091	4042.127	5715.577	7907.724	11783.389	21030.023	24431.095
2014	1098.506	1312.030	2486.689	4047.003	5790.958	7908.459	11887.713	21185.608	24428.082
2015	1098.221	1310.185	2481.857	4046.487	5831.160	7913.980	11936.026	21281.171	24444.119
2016	1098.608	1317.605	2442.806	4042.827	5795.283	7911.468	11829.990	21255.788	24446.453
2017	1097.342	1321.130	2436.545	4047.904	5819.679	7911.442	11888.274	21165.017	24439.193
2018	1096.823	1308.282	2451.241	4052.726	5848.761	7915.205	11856.650	21059.031	24437.036
2019	1098.503	1309.526	2406.728	4047.201	5827.149	7908.162	11788.895	21024.478	24431.806
2020	1100.677	1316.966	2439.099	4045.467	5833.685	7915.104	11834.049	21254.606	24442.181
2021	1097.710	1332.845	2454.874	4053.214	5878.696	7915.714	11843.131	21049.886	24434.450
2022	1096.326	1302.423	2414.836	4040.142	5756.486	7914.120	11884.711	20792.383	24429.839
2023	1096.620	1310.827	2439.267	4047.180	5835.812	7910.581	11907.371	21403.388	24437.459
2024	1099.232	1314.536	2431.857	4047.126	5797.390	7912.102	11898.501	21229.625	24442.923
2025	1098.418	1302.748	2382.011	4042.945	5797.698	7911.810	11939.459	21321.772	24444.931
2026	1095.917	1304.353	2408.720	4044.882	5810.497	7910.581	11850.126	20969.645	24429.582
2027	1098.331	1310.981	2403.819	4042.895	5778.462	7914.787	11957.273	21391.244	24442.350
2028	1098.686	1328.695	2465.780	4048.485	5836.168	7913.959	11915.081	21274.535	24439.816
2029	1097.959	1306.734	2393.444	4044.915	5775.488	7908.433	11798.310	20888.440	24427.742
2030	1097.002	1316.486	2436.470	4045.015	5734.805	7910.676	11793.986	20995.674	24430.790
2031	1096.862	1304.709	2416.530	4045.600	5807.417	7909.266	11802.923	20779.429	24433.922
2032	1098.877	1314.356	2399.095	4042.835	5775.995	7911.572	11868.767	21036.839	24434.963
2033	1096.831	1305.243	2413.691	4042.919	5735.327	7908.020	11790.929	20982.009	24429.220
2034	1097.595	1302.844	2364.069	4041.945	5741.009	7909.245	11873.594	21241.885	24445.052
2035	1097.260	1291.099	2311.793	4038.727	5754.327	7908.340	11839.206	21399.507	24431.205
2036	1096.853	1307.421	2468.587	4041.519	5799.761	7910.671	11836.137	20855.777	24436.431
2037	1096.955	1309.678	2459.594	4045.900	5799.936	7910.188	11894.702	21374.046	24437.226
2038	1097.513	1325.391	2451.415	4055.055	5844.077	7910.822	11811.454	20776.025	24436.961
2039	1098.387	1309.327	2404.909	4040.314	5748.466	7909.434	11814.413	20994.269	24430.352
2040	1097.668	1299.271	2390.924	4044.187	5774.560	7911.946	11942.439	21145.393	24433.428
2041	1094.495	1317.850	2469.715	4046.304	5801.406	7910.628	11804.620	21136.392	24431.887
2042	1095.613	1312.412	2431.797	4039.204	5805.467	7907.001	11749.560	20869.617	24434.868
2043	1098.223	1313.851	2458.225	4053.884	5856.015	7911.847	11872.113	21374.263	24443.080
2044	1097.294	1317.814	2424.424	4041.097	5719.812	7907.969	11820.879	21297.853	24436.129
2045	1096.089	1300.538	2397.942	4045.378	5748.755	7908.422	11874.994	21138.511	24438.570
2046	1097.828	1315.148	2403.808	4045.488	5781.861	7911.039	11810.371	20881.903	24439.684
2047	1097.925	1312.666	2494.261	4051.038	5817.357	7913.303	11855.230	21064.253	24434.310
2048	1096.262	1307.597	2349.288	4045.286	5770.546	7908.602	11788.799	20776.896	24433.700
2049	1096.330	1309.933	2453.583	4045.657	5800.930	7907.772	11832.814	20962.952	24429.293
2050	1097.876	1305.605	2387.628	4042.982	5782.753	7909.993	11816.286	20702.383	24431.496
2051	1097.737	1313.787	2408.109	4044.356	5785.630	7911.174	11854.480	21008.263	24440.613
2052	1096.285	1297.853	2381.130	4046.910	5794.787	7915.250	11889.838	21196.577	24438.745
2053	1100.039	1326.750	2501.577	4048.897	5808.117	7912.383	11874.796	21279.766	24441.388
2054	1095.549	1303.554	2435.743	4046.358	5767.306	7911.856	11858.891	21157.297	24430.461
2055	1097.275	1311.092	2406.442	4043.841	5691.888	7911.763	11898.797	21244.790	24438.728
2056	1096.515	1311.141	2407.431	4043.822	5754.703	7909.649	11809.911	20879.127	24434.788
2057	1096.533	1312.105	2455.706	4042.474	5793.813	7909.052	11760.962	20754.705	24429.922

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	8.499	0.000
2009	11.604	2.790
2010	8.816	2.189
2011	9.323	2.171
2012	9.297	1.985
2013	9.433	1.969
2014	9.971	2.140
2015	10.011	2.168
2016	9.994	2.156
2017	9.852	2.152
2018	9.769	2.158
2019	9.721	2.170
2020	9.686	2.174
2021	9.661	2.173
2022	9.642	2.173
2023	9.626	2.172
2024	9.617	2.173
2025	9.611	2.174

2026	9.606	2.174
2027	9.604	2.174
2028	9.603	2.175
2029	9.602	2.175
2030	9.599	2.177
2031	9.599	2.181
2032	9.600	2.184
2033	9.595	2.178
2034	9.589	2.168
2035	9.583	2.164
2036	9.580	2.165
2037	9.578	2.166
2038	9.577	2.162
2039	9.575	2.162
2040	9.574	2.165
2041	9.576	2.171
2042	9.576	2.170
2043	9.576	2.170
2044	9.577	2.174
2045	9.577	2.176
2046	9.576	2.174
2047	9.579	2.171
2048	9.580	2.169
2049	9.580	2.170
2050	9.579	2.169
2051	9.579	2.166
2052	9.576	2.165
2053	9.573	2.164
2054	9.570	2.161
2055	9.571	2.160
2056	9.575	2.160
2057	9.580	2.159

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	8.499	8.499	8.499	8.499	8.499	8.499	8.499	8.499	8.499
2009	6.526	7.587	8.318	9.676	11.253	13.099	15.227	16.954	20.144
2010	4.829	5.789	6.362	7.260	8.530	10.060	11.588	12.908	15.255
2011	5.521	6.366	6.891	7.770	9.012	10.526	12.128	13.279	15.983
2012	5.773	6.569	7.024	7.883	9.018	10.433	11.927	12.944	15.173
2013	5.964	6.730	7.181	8.025	9.135	10.562	12.128	13.123	15.083
2014	6.208	7.027	7.508	8.434	9.642	11.231	12.892	13.958	16.128
2015	6.200	7.024	7.524	8.446	9.679	11.297	12.966	14.039	16.182
2016	6.216	7.040	7.530	8.429	9.659	11.279	12.937	13.990	16.179
2017	6.101	6.911	7.386	8.281	9.526	11.140	12.785	13.856	15.970
2018	5.984	6.813	7.289	8.196	9.441	11.063	12.711	13.766	15.885
2019	5.896	6.751	7.227	8.140	9.390	11.027	12.675	13.728	15.903
2020	5.857	6.703	7.189	8.099	9.352	11.000	12.637	13.689	15.866
2021	5.823	6.671	7.171	8.069	9.334	10.970	12.604	13.679	15.815
2022	5.800	6.649	7.141	8.054	9.316	10.949	12.593	13.664	15.806
2023	5.790	6.634	7.119	8.042	9.297	10.927	12.575	13.638	15.805
2024	5.798	6.617	7.111	8.034	9.288	10.916	12.587	13.644	15.775
2025	5.784	6.617	7.107	8.034	9.282	10.925	12.564	13.619	15.826
2026	5.779	6.619	7.107	8.028	9.282	10.912	12.576	13.623	15.783
2027	5.758	6.616	7.105	8.020	9.276	10.911	12.568	13.643	15.751
2028	5.772	6.616	7.101	8.014	9.281	10.907	12.579	13.615	15.797
2029	5.785	6.608	7.094	8.017	9.277	10.915	12.574	13.645	15.718
2030	5.761	6.612	7.081	8.005	9.280	10.913	12.583	13.650	15.748
2031	5.737	6.597	7.081	8.011	9.279	10.908	12.583	13.645	15.772
2032	5.750	6.593	7.090	8.006	9.274	10.912	12.574	13.625	15.811
2033	5.758	6.598	7.085	8.003	9.274	10.909	12.559	13.600	15.770
2034	5.778	6.598	7.077	8.007	9.263	10.903	12.547	13.598	15.712
2035	5.765	6.595	7.083	8.005	9.257	10.889	12.550	13.592	15.639
2036	5.759	6.593	7.086	7.997	9.260	10.879	12.538	13.593	15.707
2037	5.765	6.599	7.079	7.993	9.257	10.887	12.526	13.606	15.673
2038	5.774	6.592	7.077	7.998	9.259	10.883	12.540	13.597	15.641
2039	5.764	6.588	7.077	7.994	9.257	10.884	12.529	13.574	15.647
2040	5.760	6.580	7.069	7.995	9.259	10.880	12.510	13.575	15.660
2041	5.750	6.588	7.068	7.993	9.259	10.893	12.529	13.596	15.679
2042	5.755	6.579	7.076	7.993	9.251	10.878	12.520	13.598	15.699
2043	5.741	6.574	7.074	7.995	9.253	10.883	12.537	13.587	15.701

2044	5.734	6.583	7.071	7.995	9.252	10.890	12.549	13.601	15.704
2045	5.737	6.575	7.084	7.992	9.251	10.900	12.522	13.608	15.758
2046	5.738	6.586	7.076	7.994	9.250	10.891	12.524	13.593	15.728
2047	5.737	6.588	7.074	7.992	9.260	10.894	12.524	13.580	15.739
2048	5.743	6.583	7.074	8.000	9.257	10.890	12.521	13.570	15.717
2049	5.756	6.574	7.072	7.997	9.264	10.892	12.526	13.577	15.710
2050	5.747	6.582	7.073	8.001	9.261	10.878	12.523	13.570	15.740
2051	5.733	6.583	7.082	8.001	9.264	10.875	12.524	13.577	15.701
2052	5.741	6.582	7.082	7.995	9.262	10.873	12.516	13.581	15.678
2053	5.741	6.581	7.079	7.998	9.248	10.874	12.506	13.563	15.665
2054	5.750	6.585	7.081	8.002	9.251	10.871	12.508	13.546	15.694
2055	5.757	6.598	7.084	7.998	9.250	10.867	12.513	13.569	15.699
2056	5.773	6.602	7.088	8.006	9.256	10.869	12.517	13.574	15.706
2057	5.777	6.599	7.083	8.008	9.255	10.888	12.520	13.586	15.683

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	5649.	5765.	5847.	5979.	6110.	6257.	6381.	6453.	6634.
2	824.	1271.	1677.	2564.	3835.	5779.	8603.	11589.	20193.
3	6987.	8747.	10069.	12647.	15897.	20287.	25149.	29441.	36923.
4	1840.	2304.	2521.	2929.	3515.	4209.	4978.	5461.	6411.
5	1986.	2489.	2832.	3354.	3976.	4687.	5454.	6004.	7016.
6	78.	108.	124.	155.	201.	258.	328.	363.	452.
7	58.	95.	121.	177.	255.	342.	439.	495.	614.
8	2.	8.	12.	20.	31.	45.	60.	70.	95.
9	1.	3.	9.	24.	47.	78.	110.	141.	217.
10	1.	1.	8.	37.	71.	120.	179.	220.	330.
11+	7.	9.	11.	15.	20.	25.	31.	34.	42.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	1097.	1311.	2407.	4044.	5755.	7910.	11810.	20879.	24435.
2	898.	1073.	1970.	3311.	4660.	6478.	9742.	17394.	20009.
3	734.	873.	1632.	2711.	3864.	5301.	7946.	14177.	16370.
4	586.	707.	1333.	2158.	3096.	4218.	6330.	11343.	13028.
5	424.	502.	920.	1564.	2240.	3059.	4596.	8193.	9446.
6	296.	354.	649.	1090.	1560.	2133.	3196.	5664.	6589.
7	203.	241.	441.	747.	1068.	1461.	2183.	3824.	4513.
8	143.	171.	320.	528.	757.	1032.	1545.	2737.	3189.
9	103.	123.	220.	379.	541.	742.	1106.	1949.	2292.
10	73.	88.	167.	271.	389.	530.	794.	1410.	1636.
11+	621.	740.	809.	940.	1115.	1354.	1677.	1876.	2240.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.327	0.061
2009	0.263	0.000
2010	0.178	0.000
2011	0.178	0.000
2012	0.178	0.000
2013	0.178	0.000
2014	0.178	0.000
2015	0.178	0.000
2016	0.178	0.000
2017	0.178	0.000
2018	0.178	0.000
2019	0.178	0.000
2020	0.178	0.000
2021	0.178	0.000
2022	0.178	0.000
2023	0.178	0.000
2024	0.178	0.000
2025	0.178	0.000
2026	0.178	0.000
2027	0.178	0.000
2028	0.178	0.000
2029	0.178	0.000
2030	0.178	0.000
2031	0.178	0.000
2032	0.178	0.000
2033	0.178	0.000

2034	0.178	0.000
2035	0.178	0.000
2036	0.178	0.000
2037	0.178	0.000
2038	0.178	0.000
2039	0.178	0.000
2040	0.178	0.000
2041	0.178	0.000
2042	0.178	0.000
2043	0.178	0.000
2044	0.178	0.000
2045	0.178	0.000
2046	0.178	0.000
2047	0.178	0.000
2048	0.178	0.000
2049	0.178	0.000
2050	0.178	0.000
2051	0.178	0.000
2052	0.178	0.000
2053	0.178	0.000
2054	0.178	0.000
2055	0.178	0.000
2056	0.178	0.000
2057	0.178	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.209	0.239	0.255	0.285	0.319	0.361	0.406	0.442	0.504
2009	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2010	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2011	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2012	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2013	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2014	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2015	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2016	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2017	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2018	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2019	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2020	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2021	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2022	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2023	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2024	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2025	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2026	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2027	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2028	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2029	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2030	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2031	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2032	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2033	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2034	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2035	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2036	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2037	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2038	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2039	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2040	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2041	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2042	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2043	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2044	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2045	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2046	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2047	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2048	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2049	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2050	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2051	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178

2052	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2053	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2054	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2055	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2056	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
2057	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.237

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.958
2009	1.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

Georges Bank Haddock

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 GB Haddock Garm3-Review Agepro

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\BGBHAD\B_GBHAD_NEWEST08CAT_75%FMSY_25K09.
 IN


 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\BGBHAD\B_GBHAD_NEWEST08CAT_75%FMSY_25K09.
 OUT


 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:          100
 TOTAL NUMBER OF SIMULATIONS:       100000
 NUMBER OF FEASIBLE SIMULATIONS:       100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008            20.901
 2009            25.000
 2010  0.263
 2011  0.263
 2012  0.263
 2013  0.263
 2014  0.263
 2015  0.263
 2016  0.263
 2017  0.263
 2018  0.263
 2019  0.263
 2020  0.263
 2021  0.263
 2022  0.263
 2023  0.263
 2024  0.263
 2025  0.263
 2026  0.263
 2027  0.263
 2028  0.263
 2029  0.263
 2030  0.263
 2031  0.263
 2032  0.263
 2033  0.263
 2034  0.263
 2035  0.263
 2036  0.263
 2037  0.263
 2038  0.263
 2039  0.263
 2040  0.263
 2041  0.263
 2042  0.263
 2043  0.263
 2044  0.263
 2045  0.263
 2046  0.263
 2047  0.263
 2048  0.263
 2049  0.263
 2050  0.263
 2051  0.263
 2052  0.263
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2053	0.263
2054	0.263
2055	0.263
2056	0.263
2057	0.263

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	355.688	74.519
2009	328.096	71.253
2010	285.600	62.770
2011	238.958	49.339
2012	218.671	45.305
2013	198.741	43.446
2014	188.532	43.360
2015	183.283	43.613
2016	181.010	43.807
2017	180.255	43.938
2018	179.836	43.965
2019	179.608	43.951
2020	179.485	43.901
2021	179.417	43.883
2022	179.322	43.838
2023	179.290	43.813
2024	179.323	43.837
2025	179.321	43.877
2026	179.304	43.916
2027	179.289	43.946
2028	179.258	43.934
2029	179.196	43.975
2030	179.160	44.047
2031	179.143	44.069
2032	179.056	43.959
2033	178.947	43.769
2034	178.870	43.714
2035	178.828	43.734
2036	178.770	43.762
2037	178.727	43.708
2038	178.680	43.717
2039	178.674	43.845
2040	178.737	43.929
2041	178.824	43.885
2042	178.845	43.807
2043	178.863	43.839
2044	178.868	43.873
2045	178.845	43.891
2046	178.894	43.863
2047	178.904	43.826
2048	178.889	43.795
2049	178.895	43.766
2050	178.940	43.735
2051	178.925	43.754
2052	178.865	43.749
2053	178.802	43.729
2054	178.824	43.740
2055	178.915	43.731
2056	179.007	43.680
2057	179.036	43.737

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	203.995	245.233	262.321	305.372	346.724	401.367	458.111	494.536	539.801
2009	183.522	221.906	239.436	279.159	319.465	371.201	426.153	461.323	506.117
2010	159.850	192.110	208.350	242.036	278.277	324.085	370.936	401.006	447.099
2011	139.505	163.869	178.288	204.290	235.197	270.187	304.834	325.559	366.954
2012	124.862	148.488	162.205	186.572	216.198	248.245	278.473	297.581	333.499
2013	107.994	130.966	144.023	167.809	196.702	227.550	256.099	273.468	306.429
2014	97.741	120.691	133.931	157.621	186.610	217.360	245.841	263.033	295.676
2015	92.101	115.042	128.321	152.286	181.343	212.055	240.953	258.247	291.578
2016	89.423	112.366	125.669	149.909	179.172	209.875	238.848	256.512	289.937
2017	87.787	111.473	124.874	148.990	178.333	209.344	238.298	255.714	288.837

2018	87.038	110.916	124.242	148.667	178.016	208.886	237.974	255.531	289.001
2019	86.989	110.790	124.329	148.376	177.750	208.671	237.645	255.267	288.250
2020	86.909	110.533	124.189	148.439	177.515	208.435	237.395	255.084	287.937
2021	87.326	110.482	124.135	148.281	177.657	208.451	237.277	254.618	287.551
2022	87.371	110.817	123.943	148.281	177.590	208.356	237.031	254.718	288.148
2023	87.258	110.524	124.127	148.356	177.495	208.197	237.125	254.571	287.766
2024	87.649	110.574	123.990	148.232	177.332	208.338	237.408	254.594	287.367
2025	87.258	110.390	123.914	148.431	177.334	208.318	237.585	254.732	286.848
2026	86.980	110.259	123.732	148.387	177.488	208.330	237.495	254.650	287.011
2027	86.976	110.358	123.911	148.123	177.218	208.442	237.248	254.876	287.368
2028	86.869	110.468	124.082	148.176	177.249	208.433	237.428	254.954	287.848
2029	86.403	110.277	123.827	147.835	177.382	208.261	237.134	255.064	288.373
2030	86.174	110.174	123.870	147.821	177.419	208.094	237.311	255.259	288.364
2031	86.624	110.060	123.769	147.909	177.103	208.242	237.148	255.107	288.526
2032	87.354	110.216	123.628	147.801	177.040	208.162	237.367	254.591	287.818
2033	87.627	110.106	123.665	148.036	176.915	207.999	236.690	254.212	287.220
2034	87.094	110.062	123.657	147.865	176.781	207.926	236.617	253.800	286.548
2035	86.674	110.332	123.582	147.816	176.892	207.585	236.814	254.050	286.168
2036	87.262	110.144	123.651	147.838	176.929	207.740	236.694	254.124	286.225
2037	86.955	110.239	123.452	147.656	176.842	207.659	236.590	253.808	286.077
2038	86.892	110.079	123.477	147.718	176.939	207.546	236.412	254.006	285.938
2039	86.383	109.851	123.268	147.668	176.701	207.811	236.410	254.175	286.678
2040	85.402	110.038	123.425	147.516	176.825	207.895	236.593	254.089	286.795
2041	86.136	110.056	123.525	147.721	176.925	207.925	236.901	254.070	287.290
2042	86.977	109.954	123.486	147.772	176.995	207.869	236.460	254.086	286.825
2043	86.316	109.935	123.533	147.880	176.921	207.927	236.649	253.969	286.673
2044	86.887	109.808	123.488	147.799	176.979	207.840	236.670	254.220	286.744
2045	86.713	109.891	123.411	147.904	177.052	207.876	236.581	254.297	287.307
2046	86.623	109.997	123.289	147.935	177.089	208.008	236.550	254.101	287.364
2047	86.862	109.783	123.374	148.121	176.963	207.826	236.907	254.094	287.000
2048	87.282	109.839	123.486	148.077	176.932	207.686	236.642	254.247	287.001
2049	86.842	110.111	123.660	147.971	177.065	207.856	236.462	253.991	286.820
2050	86.469	110.171	123.878	147.930	177.152	207.921	236.474	254.090	286.851
2051	86.466	110.098	123.852	147.943	177.020	208.072	236.662	254.013	286.392
2052	86.401	109.961	123.687	147.993	176.940	207.825	236.648	254.029	286.733
2053	86.325	109.862	123.597	147.921	176.939	207.732	236.601	253.838	286.635
2054	87.096	110.364	123.658	147.800	176.921	207.634	236.575	254.079	287.125
2055	87.328	110.513	123.842	147.801	176.884	207.796	236.583	254.221	287.138
2056	87.145	110.396	123.924	148.122	177.011	208.122	236.581	254.323	286.449
2057	86.809	110.300	123.783	148.148	177.246	208.020	236.797	254.154	286.322

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2008	371.959	77.163
2009	347.604	73.460
2010	307.533	63.335
2011	270.648	53.760
2012	246.536	50.252
2013	230.311	49.503
2014	221.946	49.675
2015	217.978	49.955
2016	216.449	50.122
2017	215.806	50.187
2018	215.448	50.184
2019	215.272	50.159
2020	215.133	50.127
2021	215.048	50.086
2022	215.017	50.061
2023	214.996	50.070
2024	215.004	50.096
2025	215.002	50.144
2026	214.981	50.162
2027	214.932	50.185
2028	214.883	50.233
2029	214.852	50.293
2030	214.784	50.311
2031	214.707	50.201
2032	214.604	50.067
2033	214.513	49.940
2034	214.425	49.937

2035	214.376	49.955
2036	214.312	49.920
2037	214.262	49.920
2038	214.257	50.022
2039	214.315	50.120
2040	214.369	50.097
2041	214.431	50.077
2042	214.467	50.056
2043	214.443	50.102
2044	214.479	50.116
2045	214.482	50.107
2046	214.497	50.070
2047	214.499	50.021
2048	214.524	49.983
2049	214.530	49.973
2050	214.526	49.953
2051	214.475	49.954
2052	214.429	49.935
2053	214.435	49.913
2054	214.508	49.887
2055	214.595	49.900
2056	214.648	49.948
2057	214.636	50.044

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	213.707	255.993	275.809	319.011	361.994	418.678	477.349	518.006	565.960
2009	200.730	237.834	257.818	296.658	339.284	392.464	447.692	482.330	535.629
2010	180.798	211.498	230.270	263.387	302.088	347.269	392.573	419.973	471.942
2011	158.916	187.838	203.968	232.734	267.459	305.335	341.606	364.175	408.349
2012	141.107	167.897	183.485	211.105	244.246	279.675	312.764	333.087	371.227
2013	125.782	152.654	167.959	195.287	228.281	263.175	295.474	315.151	352.523
2014	117.462	143.936	159.263	186.714	219.920	254.938	287.281	306.964	345.005
2015	112.646	139.228	154.650	182.680	215.940	251.108	283.756	303.607	341.919
2016	109.993	137.734	153.165	181.086	214.489	249.706	282.268	302.501	339.721
2017	108.851	137.144	152.415	180.335	213.876	249.004	281.982	301.638	339.513
2018	108.772	136.701	152.230	180.109	213.503	248.528	281.500	301.407	339.067
2019	108.203	136.218	152.190	179.710	213.293	248.400	281.347	301.315	338.664
2020	109.183	136.193	151.980	179.775	213.235	248.442	281.087	301.142	337.923
2021	108.871	136.374	151.639	179.701	213.169	248.325	280.758	300.835	338.540
2022	109.233	135.944	151.845	179.797	213.105	247.946	281.137	300.720	338.232
2023	108.981	136.215	151.727	179.798	212.808	248.113	280.858	300.809	338.411
2024	108.958	136.065	151.700	179.800	212.924	248.263	281.260	300.742	337.917
2025	108.774	136.120	151.504	179.683	213.014	248.117	281.179	300.965	337.936
2026	108.524	136.088	151.567	179.581	212.966	248.153	281.105	300.938	338.193
2027	108.453	135.900	151.728	179.437	212.923	248.172	281.083	301.072	338.798
2028	107.948	135.895	151.666	179.250	212.946	248.048	281.151	301.235	339.381
2029	107.573	135.850	151.612	179.347	213.109	247.872	280.880	301.359	338.998
2030	108.236	135.752	151.472	179.324	212.672	247.928	280.990	301.271	339.481
2031	108.662	135.769	151.283	179.171	212.660	247.756	280.988	300.581	339.181
2032	108.655	135.661	151.235	179.451	212.351	247.788	280.687	300.182	338.474
2033	109.371	135.775	151.470	179.296	212.341	247.748	280.312	300.037	337.452
2034	108.887	135.778	151.326	179.162	212.298	247.683	280.347	300.139	337.130
2035	109.021	135.626	151.290	179.161	212.249	247.620	280.415	300.271	336.670
2036	108.923	135.666	151.190	179.028	212.412	247.402	280.197	299.928	336.819
2037	108.366	135.636	151.281	179.016	212.282	247.308	279.978	300.006	336.645
2038	107.839	135.530	151.184	178.942	212.320	247.427	280.288	299.874	336.871
2039	107.078	135.542	151.159	178.918	212.277	247.612	280.267	300.093	337.293
2040	107.618	135.627	151.135	179.155	212.342	247.640	280.370	299.962	337.234
2041	108.053	135.430	151.292	179.074	212.500	247.813	280.236	300.034	337.779
2042	107.891	135.358	151.362	179.209	212.374	247.858	280.418	299.679	337.476
2043	108.000	135.356	151.207	179.186	212.488	247.709	280.403	300.174	337.547
2044	107.986	135.589	151.055	179.188	212.557	247.555	280.146	300.400	338.170
2045	108.248	135.485	151.121	179.265	212.543	247.656	280.312	300.281	337.381
2046	108.452	135.457	151.012	179.434	212.519	247.491	280.486	300.176	337.509
2047	108.836	135.369	151.246	179.534	212.387	247.609	280.055	300.377	337.215
2048	108.250	135.623	151.280	179.375	212.669	247.583	280.177	300.138	337.904
2049	107.587	135.707	151.362	179.249	212.570	247.653	279.924	300.096	337.757
2050	108.208	135.653	151.580	179.347	212.593	247.759	280.229	299.923	336.838
2051	107.919	135.633	151.400	179.368	212.410	247.770	280.375	300.199	336.855
2052	107.809	135.544	151.234	179.416	212.319	247.318	280.219	299.774	337.219

2053	108.455	135.851	151.381	179.402	212.460	247.381	280.249	300.000	337.687
2054	109.271	136.286	151.718	179.151	212.510	247.394	280.088	300.191	337.183
2055	109.097	135.867	151.553	179.462	212.641	247.751	280.118	300.019	337.532
2056	108.421	135.751	151.606	179.338	212.855	247.701	280.370	300.203	336.706
2057	107.990	135.624	151.080	179.533	212.824	247.691	280.426	300.386	336.747

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	AVG F_WT_B	STD
2008	0.060	0.013
2009	0.078	0.017
2010	0.218	0.017
2011	0.189	0.022
2012	0.167	0.023
2013	0.160	0.024
2014	0.156	0.024
2015	0.154	0.025
2016	0.153	0.025
2017	0.153	0.025
2018	0.153	0.025
2019	0.153	0.025
2020	0.153	0.025
2021	0.152	0.025
2022	0.152	0.025
2023	0.152	0.025
2024	0.152	0.025
2025	0.152	0.025
2026	0.152	0.025
2027	0.152	0.025
2028	0.153	0.025
2029	0.153	0.025
2030	0.152	0.025
2031	0.152	0.025
2032	0.153	0.025
2033	0.153	0.025
2034	0.153	0.025
2035	0.152	0.025
2036	0.152	0.025
2037	0.153	0.025
2038	0.152	0.026
2039	0.152	0.025
2040	0.152	0.025
2041	0.152	0.025
2042	0.152	0.025
2043	0.152	0.025
2044	0.152	0.025
2045	0.152	0.025
2046	0.152	0.025
2047	0.152	0.025
2048	0.152	0.025
2049	0.152	0.025
2050	0.152	0.025
2051	0.152	0.025
2052	0.153	0.025
2053	0.152	0.025
2054	0.152	0.025
2055	0.152	0.025
2056	0.152	0.025
2057	0.152	0.025

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.038	0.041	0.045	0.051	0.059	0.067	0.078	0.084	0.097
2009	0.048	0.054	0.058	0.066	0.076	0.087	0.100	0.109	0.129
2010	0.175	0.189	0.196	0.208	0.220	0.231	0.239	0.244	0.251
2011	0.138	0.152	0.160	0.174	0.189	0.205	0.218	0.226	0.239
2012	0.119	0.132	0.139	0.151	0.166	0.182	0.197	0.206	0.224
2013	0.110	0.123	0.131	0.144	0.159	0.176	0.191	0.201	0.219
2014	0.105	0.118	0.126	0.139	0.155	0.172	0.188	0.198	0.217
2015	0.101	0.115	0.123	0.137	0.153	0.171	0.187	0.197	0.216

2016	0.099	0.114	0.122	0.136	0.153	0.170	0.187	0.196	0.216
2017	0.098	0.113	0.121	0.136	0.152	0.170	0.186	0.196	0.216
2018	0.098	0.113	0.121	0.135	0.152	0.169	0.186	0.196	0.216
2019	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.215
2020	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2021	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.195	0.215
2022	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.195	0.215
2023	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.195	0.214
2024	0.097	0.112	0.120	0.135	0.151	0.169	0.185	0.195	0.215
2025	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.216
2026	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2027	0.097	0.112	0.120	0.135	0.152	0.169	0.185	0.196	0.215
2028	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2029	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2030	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.216
2031	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.195	0.215
2032	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2033	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2034	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2035	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2036	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2037	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2038	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.216
2039	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.216
2040	0.097	0.112	0.120	0.135	0.151	0.169	0.185	0.196	0.215
2041	0.097	0.112	0.120	0.135	0.151	0.169	0.186	0.196	0.215
2042	0.097	0.112	0.120	0.135	0.152	0.169	0.185	0.195	0.216
2043	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2044	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2045	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.215
2046	0.097	0.112	0.120	0.135	0.152	0.169	0.185	0.196	0.215
2047	0.097	0.112	0.121	0.135	0.151	0.169	0.185	0.196	0.215
2048	0.096	0.112	0.121	0.135	0.152	0.169	0.185	0.195	0.215
2049	0.097	0.112	0.120	0.135	0.152	0.169	0.185	0.195	0.214
2050	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.215
2051	0.097	0.112	0.121	0.135	0.152	0.169	0.185	0.196	0.215
2052	0.097	0.112	0.121	0.135	0.152	0.169	0.186	0.196	0.215
2053	0.097	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215
2054	0.096	0.112	0.120	0.135	0.151	0.169	0.186	0.196	0.215
2055	0.097	0.112	0.120	0.135	0.151	0.169	0.185	0.196	0.215
2056	0.097	0.112	0.120	0.135	0.151	0.169	0.186	0.196	0.216
2057	0.098	0.112	0.120	0.135	0.152	0.169	0.186	0.196	0.215

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	385.050	78.564
2009	363.422	75.289
2010	337.129	71.417
2011	285.028	56.681
2012	261.395	51.910
2013	239.032	49.887
2014	227.542	49.780
2015	221.639	50.051
2016	219.125	50.252
2017	218.296	50.384
2018	217.818	50.408
2019	217.576	50.397
2020	217.412	50.361
2021	217.325	50.327
2022	217.262	50.291
2023	217.220	50.277
2024	217.231	50.292
2025	217.237	50.337
2026	217.220	50.367
2027	217.179	50.402
2028	217.140	50.428
2029	217.097	50.474
2030	217.029	50.520
2031	216.974	50.480
2032	216.884	50.371

2033	216.780	50.197
2034	216.677	50.143
2035	216.626	50.160
2036	216.560	50.158
2037	216.510	50.126
2038	216.481	50.176
2039	216.507	50.291
2040	216.553	50.336
2041	216.637	50.325
2042	216.679	50.267
2043	216.672	50.301
2044	216.702	50.322
2045	216.690	50.340
2046	216.717	50.306
2047	216.726	50.257
2048	216.745	50.219
2049	216.738	50.201
2050	216.756	50.166
2051	216.728	50.169
2052	216.684	50.154
2053	216.650	50.125
2054	216.688	50.107
2055	216.773	50.131
2056	216.856	50.132
2057	216.874	50.200

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	224.266	267.944	287.159	331.594	375.491	433.270	492.208	533.146	581.495
2009	212.456	251.422	271.277	311.231	354.523	409.290	466.980	503.026	555.208
2010	195.023	229.753	250.318	287.651	329.899	381.318	433.895	466.593	520.575
2011	168.924	198.580	215.189	245.004	281.113	321.119	360.500	384.265	431.518
2012	153.163	180.646	196.697	224.672	258.724	295.438	329.851	351.110	392.178
2013	133.989	160.902	176.246	203.743	236.830	272.059	304.514	324.732	362.328
2014	122.712	149.309	164.677	192.215	225.543	260.643	293.074	312.722	350.466
2015	116.514	142.869	158.302	186.206	219.592	254.697	287.608	307.546	345.860
2016	113.053	140.102	155.686	183.685	217.081	252.322	285.097	305.544	343.882
2017	111.322	139.180	154.696	182.554	216.270	251.542	284.613	304.401	342.013
2018	110.411	138.482	154.229	182.340	215.785	251.179	284.344	304.303	341.558
2019	110.257	138.386	154.232	181.924	215.498	250.718	284.065	304.069	341.877
2020	110.866	138.109	153.924	181.870	215.429	250.774	283.591	303.681	341.184
2021	110.881	138.121	153.896	181.706	215.360	250.646	283.582	303.618	341.406
2022	110.983	138.158	153.569	181.796	215.257	250.479	283.593	303.559	341.216
2023	111.054	138.099	153.749	182.025	215.181	250.440	283.567	303.632	341.127
2024	110.915	138.203	153.674	181.670	215.004	250.514	283.664	303.186	340.803
2025	110.656	138.001	153.623	181.765	215.115	250.529	283.794	303.858	340.582
2026	110.451	138.003	153.442	181.843	215.231	250.320	283.763	303.808	340.991
2027	110.766	137.963	153.517	181.572	215.102	250.653	283.485	303.610	340.988
2028	110.292	137.660	153.621	181.498	215.178	250.406	283.558	304.008	341.544
2029	109.578	137.783	153.655	181.287	215.350	250.319	283.505	304.035	341.432
2030	109.550	137.652	153.417	181.284	215.018	250.311	283.556	303.895	341.874
2031	110.206	137.591	153.314	181.228	214.937	250.321	283.665	303.426	341.891
2032	110.828	137.746	153.151	181.375	214.802	250.146	283.179	303.181	341.366
2033	111.027	137.697	153.349	181.390	214.622	250.085	282.947	302.826	340.627
2034	110.896	137.645	153.275	181.264	214.561	250.070	282.863	302.767	339.615
2035	110.867	137.651	153.193	181.233	214.512	249.938	282.958	302.697	339.620
2036	110.871	137.779	153.139	181.215	214.644	249.843	282.973	302.595	339.585
2037	110.483	137.683	153.203	180.965	214.573	249.658	282.627	302.529	339.666
2038	110.088	137.565	153.352	180.981	214.528	249.756	282.431	302.611	339.412
2039	109.211	137.451	152.976	181.115	214.483	249.855	282.612	302.516	339.693
2040	109.074	137.591	153.110	181.147	214.426	250.094	282.866	302.330	340.367
2041	109.763	137.376	153.057	181.176	214.670	249.924	282.906	302.546	340.267
2042	110.313	137.276	153.192	181.125	214.687	250.222	282.630	302.480	340.684
2043	110.020	137.348	153.129	181.196	214.602	250.104	282.861	302.376	340.117
2044	110.203	137.304	153.154	181.256	214.727	249.910	282.833	302.856	340.520
2045	110.295	137.254	153.075	181.256	214.695	250.063	282.684	303.129	341.018
2046	110.330	137.409	152.997	181.296	214.698	250.103	282.997	302.862	340.588
2047	110.552	137.422	153.110	181.632	214.532	249.786	283.085	302.737	340.259
2048	110.475	137.434	153.273	181.475	214.707	249.866	282.688	303.067	340.909
2049	109.996	137.526	153.357	181.353	214.933	249.992	282.612	302.732	340.819
2050	110.338	137.709	153.563	181.306	214.696	250.151	282.788	302.514	339.267

2051	110.311	137.582	153.446	181.336	214.726	250.229	282.771	302.736	339.324
2052	109.842	137.657	153.453	181.463	214.619	249.898	283.059	302.418	339.585
2053	110.327	137.601	153.239	181.527	214.581	249.782	282.594	302.336	340.538
2054	110.911	138.113	153.396	181.266	214.651	249.674	282.702	302.830	340.364
2055	110.991	137.859	153.432	181.325	214.662	250.093	282.494	302.652	339.992
2056	110.815	137.790	153.580	181.668	214.737	250.240	282.733	302.903	339.456
2057	110.292	137.872	153.260	181.535	214.998	250.096	283.082	303.063	339.341

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	60675.500	40816.955
2009	60616.508	40872.124
2010	60786.634	40839.008
2011	60524.470	40844.345
2012	60664.588	40768.239
2013	60353.782	40627.468
2014	60549.704	40677.371
2015	60692.173	40875.256
2016	60618.291	40816.838
2017	60649.731	40769.218
2018	60748.481	40736.948
2019	60440.193	40628.304
2020	60671.058	40873.920
2021	60813.603	40733.966
2022	60545.597	40819.517
2023	60648.649	40835.852
2024	60656.315	40815.949
2025	60609.773	40944.881
2026	60487.930	40697.620
2027	60593.323	40929.749
2028	60685.576	40796.015
2029	60354.911	40633.393
2030	60432.451	40650.007
2031	60461.037	40718.030
2032	60508.839	40775.171
2033	60338.791	40644.766
2034	60486.477	40859.033
2035	60353.077	40835.856
2036	60437.529	40720.767
2037	60571.590	40802.672
2038	60643.842	40596.966
2039	60383.947	40712.958
2040	60560.532	40825.755
2041	60558.173	40649.516
2042	60292.180	40665.046
2043	60782.193	40721.574
2044	60405.727	40742.810
2045	60482.860	40772.833
2046	60518.760	40719.568
2047	60672.003	40699.343
2048	60418.909	40681.771
2049	60425.092	40647.169
2050	60390.192	40646.114
2051	60565.968	40810.034
2052	60659.706	40866.613
2053	60644.312	40738.731
2054	60545.666	40754.612
2055	60509.342	40854.385
2056	60440.997	40743.496
2057	60397.939	40570.327

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1428.346	3879.189	6680.460	32528.677	58699.186	90183.120	123091.554	130523.662	168167.745
2009	1392.155	3861.796	6676.822	32517.913	58589.675	90035.478	123101.818	130458.248	168315.495
2010	1380.018	3899.682	6760.965	32536.519	58720.191	90201.618	123094.470	130525.851	169036.447
2011	1377.506	3932.044	6758.420	32360.262	58421.754	89931.241	122968.026	130416.841	170004.534
2012	1434.325	3947.743	6774.078	32518.381	58684.517	90198.666	122955.810	130349.459	168065.664

2013	1407.317	3917.684	6755.585	32245.710	58234.088	89506.622	122892.841	130401.126	167605.411
2014	1425.501	3910.696	6819.146	32519.739	58666.652	89594.929	123053.135	130460.184	167261.779
2015	1417.396	3903.938	6811.188	32516.981	58698.895	90138.755	123127.370	130496.458	169091.158
2016	1428.404	3931.122	6746.880	32297.388	58677.184	89937.913	122964.444	130486.823	169357.334
2017	1392.443	3944.038	6736.570	32524.552	58691.948	89935.776	123053.998	130452.368	168529.181
2018	1377.723	3896.964	6760.772	32550.326	58709.547	90236.747	123005.407	130412.137	168283.164
2019	1425.416	3901.522	6687.469	32520.797	58696.468	89559.266	122901.300	130399.021	167686.503
2020	1487.143	3928.783	6740.777	32492.128	58700.423	90228.617	122970.681	130486.374	168870.084
2021	1402.905	3986.961	6766.753	32552.935	58727.662	90277.455	122984.634	130408.666	167988.156
2022	1363.606	3875.495	6700.821	32099.232	58468.839	90150.002	123048.523	130310.921	167462.172
2023	1371.948	3906.291	6741.052	32520.682	58701.710	89850.091	123083.341	130542.850	168331.391
2024	1446.111	3919.878	6728.851	32520.394	58678.459	89988.622	123069.711	130476.892	168954.697
2025	1423.009	3876.687	6646.767	32306.060	58678.646	89965.225	123132.644	130511.870	169183.698
2026	1351.972	3882.570	6690.750	32449.028	58686.391	89850.137	122995.383	130378.208	167432.839
2027	1420.526	3906.852	6682.679	32302.364	58594.943	90203.280	123160.016	130538.240	168889.363
2028	1430.603	3971.756	6784.714	32527.658	58701.926	90137.065	123095.188	130493.939	168600.278
2029	1409.967	3891.292	6665.595	32451.435	58577.881	89591.881	122915.766	130347.383	167222.997
2030	1382.806	3927.022	6736.447	32458.803	58344.426	89861.564	122909.122	130388.088	167570.690
2031	1378.829	3883.874	6703.611	32501.979	58684.527	89691.972	122922.856	130306.004	167927.883
2032	1436.024	3919.219	6674.901	32297.975	58580.789	89946.210	123024.025	130403.713	168046.634
2033	1377.933	3885.831	6698.937	32304.153	58347.421	89542.162	122904.425	130382.900	167391.525
2034	1399.626	3877.038	6617.221	32232.271	58380.024	89689.511	123031.442	130481.546	169197.571
2035	1390.114	3834.007	6531.135	31994.838	58456.448	89580.683	122978.604	130541.377	167618.009
2036	1378.563	3893.809	6789.336	32200.829	58679.894	89860.939	122973.889	130334.985	168214.101
2037	1381.461	3902.078	6774.528	32513.841	58680.000	89802.810	123063.874	130531.712	168304.786
2038	1397.304	3959.652	6761.058	32562.777	58706.712	89879.047	122935.963	130304.712	168274.553
2039	1422.120	3900.795	6684.474	32111.954	58422.818	89712.214	122940.510	130387.554	167520.702
2040	1401.692	3863.948	6661.444	32397.682	58572.553	89976.148	123137.223	130444.919	167871.558
2041	1311.620	3932.022	6791.194	32516.004	58680.890	89855.741	122925.463	130441.502	167695.847
2042	1343.362	3912.098	6728.752	32029.996	58683.347	89419.656	122840.862	130340.238	168035.806
2043	1417.477	3917.369	6772.273	32556.516	58713.936	89968.200	123029.166	130531.795	168972.545
2044	1391.083	3931.888	6716.610	32169.738	58258.390	89536.053	122950.444	130502.790	168179.674
2045	1356.880	3868.591	6673.002	32485.609	58424.477	89590.481	123033.593	130442.306	168458.091
2046	1406.253	3922.121	6682.661	32493.678	58614.447	89903.554	122934.299	130344.902	168585.174
2047	1408.994	3913.026	6831.614	32541.305	58690.542	90084.646	123003.225	130414.119	167972.179
2048	1361.770	3894.456	6592.881	32478.828	58549.519	89612.095	122901.153	130305.043	167902.643
2049	1363.714	3903.012	6764.628	32506.177	58680.601	89512.340	122968.782	130375.667	167399.843
2050	1407.622	3887.155	6656.016	32308.803	58619.570	89779.435	122943.387	130276.758	167651.243
2051	1403.655	3917.134	6689.744	32410.158	58636.078	89914.353	123002.072	130392.866	168691.130
2052	1362.440	3858.752	6645.316	32519.242	58676.884	90240.297	123056.401	130464.348	168478.047
2053	1469.043	3964.631	6843.661	32529.863	58684.951	90011.020	123033.288	130495.925	168779.614
2054	1341.546	3879.641	6735.250	32516.288	58530.925	89968.934	123008.851	130449.438	167533.187
2055	1390.555	3907.262	6686.999	32372.196	58098.152	89961.437	123070.167	130482.648	168476.117
2056	1368.958	3907.438	6688.628	32370.801	58458.608	89737.977	122933.592	130343.848	168026.689
2057	1369.485	3910.972	6768.124	32271.280	58676.295	89666.208	122858.381	130296.619	167471.620

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	20.901	0.000
2009	25.000	0.000
2010	64.293	14.796
2011	47.968	10.461
2012	40.461	8.293
2013	36.037	7.879
2014	33.748	7.895
2015	32.552	7.985
2016	32.009	8.053
2017	31.835	8.099
2018	31.709	8.104
2019	31.650	8.111
2020	31.623	8.110
2021	31.604	8.099
2022	31.594	8.091
2023	31.588	8.088
2024	31.571	8.076
2025	31.580	8.087
2026	31.589	8.090
2027	31.577	8.102
2028	31.576	8.106
2029	31.573	8.105
2030	31.563	8.113

2031	31.550	8.118
2032	31.548	8.130
2033	31.542	8.111
2034	31.512	8.075
2035	31.500	8.055
2036	31.493	8.070
2037	31.488	8.073
2038	31.473	8.063
2039	31.472	8.065
2040	31.467	8.089
2041	31.478	8.104
2042	31.496	8.099
2043	31.507	8.081
2044	31.499	8.079
2045	31.504	8.098
2046	31.506	8.093
2047	31.498	8.090
2048	31.518	8.082
2049	31.506	8.076
2050	31.507	8.074
2051	31.513	8.068
2052	31.520	8.067
2053	31.501	8.073
2054	31.492	8.064
2055	31.492	8.068
2056	31.511	8.073
2057	31.530	8.065

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	20.901	20.901	20.901	20.901	20.901	20.901	20.901	20.901	20.901
2009	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
2010	34.218	42.460	46.040	54.111	62.515	73.078	84.693	91.964	101.339
2011	27.013	32.389	35.175	40.645	46.784	54.343	62.207	67.183	74.786
2012	23.857	27.833	30.254	34.628	39.846	45.681	51.534	54.960	62.298
2013	19.954	23.922	26.221	30.384	35.541	41.219	46.542	49.779	55.804
2014	17.584	21.544	23.865	28.079	33.303	38.983	44.269	47.502	53.346
2015	16.151	20.134	22.563	26.824	32.144	37.844	43.148	46.330	52.341
2016	15.436	19.507	21.930	26.256	31.582	37.312	42.745	46.011	52.106
2017	15.182	19.231	21.635	26.045	31.420	37.176	42.583	45.849	52.021
2018	14.920	19.107	21.555	25.888	31.295	37.096	42.483	45.706	51.817
2019	14.802	19.032	21.451	25.877	31.218	37.021	42.451	45.713	51.727
2020	14.806	19.046	21.439	25.825	31.199	36.989	42.410	45.672	51.686
2021	14.822	19.007	21.450	25.807	31.171	36.952	42.355	45.616	51.744
2022	14.831	18.986	21.446	25.805	31.192	36.969	42.348	45.567	51.594
2023	14.901	19.055	21.422	25.818	31.178	36.966	42.327	45.596	51.713
2024	14.825	19.025	21.411	25.837	31.152	36.897	42.351	45.560	51.570
2025	14.962	19.047	21.413	25.786	31.139	36.924	42.343	45.578	51.628
2026	14.849	18.998	21.412	25.837	31.157	36.949	42.352	45.612	51.532
2027	14.818	18.923	21.396	25.821	31.160	36.942	42.394	45.588	51.603
2028	14.708	18.963	21.411	25.787	31.154	36.952	42.337	45.624	51.682
2029	14.839	19.005	21.412	25.785	31.132	36.952	42.325	45.677	51.695
2030	14.715	18.978	21.384	25.757	31.124	36.955	42.355	45.637	51.706
2031	14.663	18.933	21.395	25.749	31.157	36.906	42.324	45.653	51.761
2032	14.735	18.923	21.369	25.731	31.105	36.924	42.327	45.639	51.796
2033	14.865	18.982	21.318	25.754	31.107	36.940	42.338	45.556	51.697
2034	14.883	18.961	21.362	25.751	31.069	36.871	42.273	45.521	51.512
2035	14.839	18.904	21.371	25.761	31.088	36.830	42.210	45.473	51.288
2036	14.772	18.946	21.347	25.730	31.064	36.814	42.222	45.512	51.445
2037	14.841	18.919	21.350	25.722	31.067	36.820	42.300	45.475	51.351
2038	14.851	18.965	21.359	25.692	31.053	36.842	42.211	45.444	51.284
2039	14.761	18.897	21.342	25.727	31.081	36.795	42.236	45.480	51.394
2040	14.654	18.878	21.285	25.698	31.054	36.871	42.216	45.473	51.427
2041	14.540	18.895	21.312	25.703	31.045	36.880	42.221	45.484	51.494
2042	14.645	18.960	21.364	25.691	31.059	36.868	42.288	45.483	51.715
2043	14.784	18.886	21.332	25.717	31.105	36.860	42.239	45.472	51.524
2044	14.746	18.911	21.342	25.728	31.078	36.856	42.243	45.482	51.387
2045	14.746	18.885	21.332	25.738	31.072	36.874	42.265	45.517	51.529
2046	14.779	18.861	21.330	25.747	31.091	36.884	42.231	45.507	51.598
2047	14.777	18.907	21.301	25.741	31.082	36.872	42.148	45.497	51.647
2048	14.806	18.902	21.330	25.778	31.097	36.844	42.306	45.462	51.498

2049	14.788	18.894	21.340	25.782	31.087	36.816	42.220	45.513	51.471
2050	14.802	18.932	21.395	25.736	31.083	36.844	42.242	45.494	51.474
2051	14.764	18.973	21.435	25.755	31.104	36.847	42.230	45.453	51.476
2052	14.785	18.980	21.411	25.769	31.092	36.896	42.247	45.458	51.400
2053	14.712	18.927	21.383	25.770	31.062	36.829	42.228	45.501	51.468
2054	14.745	18.897	21.371	25.765	31.086	36.813	42.198	45.457	51.446
2055	14.796	18.961	21.359	25.720	31.078	36.811	42.237	45.474	51.546
2056	14.857	19.025	21.403	25.721	31.066	36.845	42.237	45.493	51.610
2057	14.903	18.977	21.409	25.776	31.123	36.900	42.241	45.478	51.500

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	2279.	4125.	5904.	10116.	17191.	27323.	41361.	51728.	81177.
2	2466.	3012.	3551.	4673.	6276.	8165.	10275.	11859.	15235.
3	7612.	10121.	11567.	14254.	17784.	21535.	25867.	28765.	34219.
4	2113.	2619.	2859.	3421.	4186.	4989.	5736.	6240.	7573.
5	112556.	140556.	153106.	180486.	210162.	243239.	281916.	304860.	340996.
6	417.	495.	559.	679.	820.	970.	1113.	1189.	1353.
7	455.	608.	668.	813.	977.	1169.	1374.	1494.	1739.
8	4524.	5828.	6625.	7989.	9798.	11757.	14197.	15717.	18713.
9+	300.	300.	300.	300.	300.	300.	300.	300.	300.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	1369.	3907.	6689.	32371.	58459.	89738.	122934.	130344.	168027.
2	1134.	3187.	5455.	26408.	47394.	73386.	100395.	106442.	137435.
3	889.	2571.	4463.	21548.	38787.	59620.	81515.	86446.	111020.
4	767.	2069.	3571.	16973.	30621.	46966.	64196.	68090.	88066.
5	524.	1485.	2558.	12519.	22588.	34739.	47372.	50224.	64858.
6	340.	949.	1621.	7853.	14207.	21786.	29803.	31593.	40873.
7	215.	593.	1015.	4927.	8939.	13691.	18749.	19867.	25566.
8	131.	375.	649.	3120.	5632.	8591.	11803.	12514.	16067.
9+	3595.	5031.	5927.	7575.	9612.	11974.	14155.	15410.	17703.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.065	0.015
2009	0.088	0.021
2010	0.263	0.000
2011	0.263	0.000
2012	0.263	0.000
2013	0.263	0.000
2014	0.263	0.000
2015	0.263	0.000
2016	0.263	0.000
2017	0.263	0.000
2018	0.263	0.000
2019	0.263	0.000
2020	0.263	0.000
2021	0.263	0.000
2022	0.263	0.000
2023	0.263	0.000
2024	0.263	0.000
2025	0.263	0.000
2026	0.263	0.000
2027	0.263	0.000
2028	0.263	0.000
2029	0.263	0.000
2030	0.263	0.000
2031	0.263	0.000
2032	0.263	0.000
2033	0.263	0.000
2034	0.263	0.000
2035	0.263	0.000
2036	0.263	0.000
2037	0.263	0.000
2038	0.263	0.000
2039	0.263	0.000
2040	0.263	0.000
2041	0.263	0.000
2042	0.263	0.000

2043	0.263	0.000
2044	0.263	0.000
2045	0.263	0.000
2046	0.263	0.000
2047	0.263	0.000
2048	0.263	0.000
2049	0.263	0.000
2050	0.263	0.000
2051	0.263	0.000
2052	0.263	0.000
2053	0.263	0.000
2054	0.263	0.000
2055	0.263	0.000
2056	0.263	0.000
2057	0.263	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.040	0.044	0.047	0.055	0.064	0.073	0.085	0.093	0.110	
2009	0.053	0.058	0.063	0.073	0.086	0.099	0.117	0.127	0.150	
2010	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2011	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2012	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2013	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2014	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2015	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2016	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2017	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2018	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2019	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2020	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2021	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2022	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2023	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2024	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2025	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2026	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2027	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2028	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2029	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2030	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2031	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2032	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2033	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2034	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2035	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2036	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2037	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2038	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2039	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2040	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2041	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2042	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2043	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2044	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2045	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2046	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2047	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2048	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2049	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2050	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2051	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2052	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2053	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2054	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2055	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2056	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	
2057	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	

Gulf of Maine Haddock

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 AGEPRO GoM haddock

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\RGMHAD\R_GMHAD_NEWEST08CAT__75%FMSY.IN



 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\RGMHAD\R_GMHAD_NEWEST08CAT__75%FMSY.OUT



 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:          100
 TOTAL NUMBER OF SIMULATIONS:       100000
 NUMBER OF FEASIBLE SIMULATIONS:       100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             1.197
 2009  0.261
 2010  0.323
 2011  0.323
 2012  0.323
 2013  0.323
 2014  0.323
 2015  0.323
 2016  0.323
 2017  0.323
 2018  0.323
 2019  0.323
 2020  0.323
 2021  0.323
 2022  0.323
 2023  0.323
 2024  0.323
 2025  0.323
 2026  0.323
 2027  0.323
 2028  0.323
 2029  0.323
 2030  0.323
 2031  0.323
 2032  0.323
 2033  0.323
 2034  0.323
 2035  0.323
 2036  0.323
 2037  0.323
 2038  0.323
 2039  0.323
 2040  0.323
 2041  0.323
 2042  0.323
 2043  0.323
 2044  0.323
 2045  0.323
 2046  0.323
 2047  0.323
 2048  0.323
 2049  0.323
 2050  0.323
 2051  0.323
 2052  0.323
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2053	0.323
2054	0.323
2055	0.323
2056	0.323
2057	0.323

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	6.654	1.569
2009	6.559	1.856
2010	6.111	1.687
2011	5.884	1.721
2012	5.962	2.196
2013	6.317	2.649
2014	6.665	2.932
2015	6.900	3.056
2016	7.071	3.103
2017	7.184	3.119
2018	7.256	3.123
2019	7.301	3.125
2020	7.330	3.124
2021	7.347	3.123
2022	7.352	3.119
2023	7.357	3.117
2024	7.364	3.120
2025	7.367	3.119
2026	7.370	3.117
2027	7.372	3.121
2028	7.374	3.125
2029	7.372	3.130
2030	7.370	3.132
2031	7.370	3.134
2032	7.363	3.126
2033	7.352	3.110
2034	7.344	3.102
2035	7.340	3.102
2036	7.336	3.104
2037	7.335	3.098
2038	7.337	3.099
2039	7.338	3.107
2040	7.342	3.118
2041	7.344	3.119
2042	7.343	3.111
2043	7.344	3.110
2044	7.345	3.114
2045	7.343	3.114
2046	7.346	3.110
2047	7.348	3.109
2048	7.347	3.111
2049	7.347	3.112
2050	7.347	3.111
2051	7.345	3.110
2052	7.340	3.106
2053	7.334	3.100
2054	7.333	3.098
2055	7.340	3.101
2056	7.348	3.102
2057	7.354	3.106

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3.834	4.430	4.854	5.556	6.490	7.522	8.715	9.471	11.020
2009	3.416	4.030	4.509	5.261	6.320	7.544	8.954	9.888	11.860
2010	3.299	3.917	4.259	4.940	5.850	6.958	8.224	9.208	11.169
2011	3.156	3.683	4.003	4.673	5.591	6.738	8.148	9.178	11.258
2012	2.871	3.361	3.684	4.379	5.501	7.004	8.800	10.278	13.362
2013	2.647	3.154	3.509	4.340	5.811	7.576	9.893	11.660	14.711
2014	2.467	3.018	3.435	4.507	6.085	8.173	10.714	12.419	15.748
2015	2.371	2.984	3.480	4.676	6.315	8.515	11.093	12.844	16.169
2016	2.359	3.042	3.587	4.805	6.514	8.731	11.326	13.079	16.481
2017	2.348	3.105	3.671	4.909	6.643	8.859	11.453	13.157	16.577

2018	2.388	3.158	3.736	4.983	6.711	8.952	11.529	13.262	16.613
2019	2.418	3.195	3.777	5.041	6.766	8.991	11.558	13.269	16.681
2020	2.439	3.231	3.805	5.060	6.797	9.014	11.583	13.289	16.764
2021	2.455	3.247	3.830	5.067	6.813	9.037	11.598	13.356	16.722
2022	2.478	3.252	3.831	5.087	6.818	9.044	11.612	13.345	16.760
2023	2.478	3.255	3.836	5.097	6.821	9.045	11.607	13.350	16.733
2024	2.484	3.263	3.849	5.102	6.822	9.047	11.611	13.365	16.745
2025	2.481	3.267	3.840	5.109	6.824	9.054	11.638	13.366	16.719
2026	2.484	3.259	3.843	5.111	6.834	9.053	11.635	13.377	16.722
2027	2.477	3.266	3.845	5.110	6.833	9.058	11.650	13.379	16.687
2028	2.479	3.259	3.840	5.104	6.839	9.067	11.664	13.405	16.751
2029	2.479	3.269	3.852	5.088	6.835	9.051	11.674	13.469	16.757
2030	2.468	3.269	3.828	5.093	6.841	9.048	11.667	13.424	16.787
2031	2.467	3.260	3.837	5.094	6.828	9.060	11.656	13.391	16.782
2032	2.476	3.263	3.844	5.086	6.822	9.062	11.662	13.383	16.760
2033	2.490	3.267	3.846	5.095	6.808	9.041	11.620	13.358	16.587
2034	2.480	3.260	3.842	5.091	6.806	9.037	11.605	13.337	16.617
2035	2.474	3.268	3.839	5.088	6.803	9.021	11.579	13.288	16.646
2036	2.486	3.258	3.831	5.073	6.796	9.013	11.585	13.306	16.671
2037	2.472	3.263	3.832	5.078	6.796	9.014	11.599	13.310	16.604
2038	2.481	3.249	3.832	5.079	6.816	9.027	11.587	13.290	16.605
2039	2.461	3.251	3.828	5.068	6.805	9.025	11.596	13.287	16.644
2040	2.455	3.260	3.832	5.067	6.802	9.029	11.585	13.311	16.774
2041	2.457	3.249	3.836	5.075	6.803	9.030	11.584	13.330	16.804
2042	2.461	3.258	3.840	5.070	6.802	9.040	11.595	13.296	16.729
2043	2.457	3.271	3.846	5.074	6.799	9.049	11.600	13.347	16.634
2044	2.452	3.268	3.842	5.086	6.798	9.031	11.611	13.345	16.603
2045	2.454	3.270	3.834	5.081	6.798	9.029	11.588	13.293	16.709
2046	2.475	3.262	3.832	5.083	6.811	9.034	11.595	13.284	16.743
2047	2.484	3.247	3.827	5.092	6.814	9.033	11.584	13.292	16.661
2048	2.475	3.258	3.830	5.084	6.820	9.035	11.572	13.319	16.660
2049	2.471	3.254	3.839	5.081	6.826	9.019	11.599	13.329	16.705
2050	2.462	3.258	3.839	5.093	6.818	9.018	11.589	13.342	16.699
2051	2.466	3.258	3.836	5.085	6.813	9.027	11.590	13.321	16.625
2052	2.472	3.253	3.839	5.084	6.806	9.015	11.562	13.279	16.707
2053	2.464	3.253	3.832	5.087	6.799	9.014	11.554	13.272	16.683
2054	2.490	3.262	3.842	5.081	6.804	9.002	11.564	13.283	16.634
2055	2.488	3.286	3.844	5.081	6.814	9.013	11.585	13.310	16.608
2056	2.484	3.276	3.842	5.100	6.809	9.020	11.605	13.308	16.700
2057	2.487	3.259	3.832	5.102	6.817	9.041	11.618	13.315	16.624

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2008	6.691	1.660
2009	6.568	1.775
2010	6.344	1.699
2011	6.271	1.914
2012	6.411	2.343
2013	6.748	2.713
2014	7.054	2.934
2015	7.260	3.029
2016	7.413	3.066
2017	7.516	3.078
2018	7.581	3.081
2019	7.621	3.083
2020	7.645	3.082
2021	7.659	3.080
2022	7.666	3.077
2023	7.671	3.078
2024	7.676	3.079
2025	7.679	3.077
2026	7.683	3.076
2027	7.684	3.080
2028	7.684	3.086
2029	7.683	3.090
2030	7.681	3.090
2031	7.676	3.087
2032	7.668	3.077
2033	7.660	3.065
2034	7.653	3.061

2035	7.648	3.061
2036	7.646	3.058
2037	7.646	3.056
2038	7.648	3.061
2039	7.650	3.069
2040	7.652	3.075
2041	7.654	3.074
2042	7.655	3.069
2043	7.655	3.070
2044	7.655	3.072
2045	7.655	3.070
2046	7.657	3.068
2047	7.658	3.067
2048	7.658	3.069
2049	7.658	3.069
2050	7.656	3.068
2051	7.652	3.066
2052	7.648	3.061
2053	7.645	3.056
2054	7.648	3.055
2055	7.654	3.058
2056	7.661	3.061
2057	7.665	3.066

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3.729	4.373	4.802	5.496	6.498	7.604	8.872	9.775	11.321
2009	3.511	4.174	4.585	5.326	6.337	7.496	8.852	9.833	11.831
2010	3.480	4.078	4.441	5.160	6.091	7.241	8.563	9.508	11.467
2011	3.273	3.829	4.187	4.907	5.932	7.247	8.763	9.934	12.419
2012	3.003	3.539	3.911	4.700	5.975	7.543	9.500	11.065	13.924
2013	2.806	3.367	3.777	4.745	6.242	8.115	10.474	12.085	15.158
2014	2.666	3.283	3.766	4.923	6.495	8.607	11.097	12.753	15.993
2015	2.590	3.288	3.844	5.054	6.719	8.911	11.406	13.080	16.413
2016	2.572	3.357	3.943	5.184	6.897	9.085	11.601	13.267	16.626
2017	2.593	3.426	4.028	5.282	7.005	9.206	11.732	13.359	16.697
2018	2.630	3.474	4.076	5.351	7.081	9.278	11.796	13.455	16.738
2019	2.668	3.511	4.108	5.389	7.118	9.318	11.827	13.469	16.808
2020	2.693	3.546	4.139	5.405	7.144	9.347	11.829	13.503	16.840
2021	2.709	3.551	4.157	5.419	7.157	9.357	11.848	13.529	16.805
2022	2.716	3.556	4.164	5.440	7.158	9.355	11.853	13.524	16.810
2023	2.726	3.568	4.168	5.445	7.160	9.357	11.857	13.540	16.824
2024	2.726	3.568	4.182	5.447	7.159	9.373	11.880	13.554	16.767
2025	2.733	3.564	4.182	5.457	7.173	9.376	11.889	13.554	16.809
2026	2.723	3.570	4.173	5.457	7.180	9.376	11.909	13.561	16.748
2027	2.722	3.564	4.177	5.448	7.182	9.383	11.907	13.570	16.770
2028	2.720	3.574	4.173	5.443	7.183	9.377	11.908	13.590	16.813
2029	2.711	3.581	4.180	5.434	7.187	9.371	11.916	13.636	16.855
2030	2.703	3.572	4.170	5.433	7.177	9.373	11.903	13.587	16.943
2031	2.717	3.564	4.177	5.441	7.160	9.382	11.899	13.552	16.875
2032	2.723	3.568	4.172	5.434	7.155	9.373	11.880	13.545	16.821
2033	2.727	3.570	4.173	5.436	7.148	9.353	11.866	13.512	16.693
2034	2.723	3.568	4.175	5.423	7.145	9.344	11.846	13.482	16.709
2035	2.724	3.572	4.168	5.424	7.142	9.335	11.815	13.480	16.744
2036	2.720	3.574	4.173	5.415	7.145	9.334	11.839	13.455	16.704
2037	2.717	3.568	4.168	5.421	7.144	9.333	11.838	13.487	16.706
2038	2.717	3.560	4.161	5.418	7.154	9.342	11.846	13.460	16.702
2039	2.706	3.561	4.157	5.414	7.150	9.356	11.836	13.484	16.746
2040	2.699	3.555	4.168	5.411	7.147	9.357	11.827	13.512	16.821
2041	2.710	3.569	4.168	5.418	7.149	9.358	11.856	13.503	16.870
2042	2.712	3.576	4.173	5.418	7.147	9.366	11.848	13.491	16.745
2043	2.705	3.576	4.175	5.420	7.136	9.362	11.848	13.524	16.718
2044	2.693	3.579	4.172	5.428	7.147	9.344	11.844	13.508	16.771
2045	2.697	3.574	4.161	5.425	7.156	9.353	11.846	13.463	16.811
2046	2.725	3.554	4.171	5.430	7.158	9.358	11.825	13.492	16.839
2047	2.724	3.563	4.166	5.434	7.160	9.357	11.802	13.480	16.718
2048	2.714	3.560	4.173	5.429	7.156	9.344	11.833	13.490	16.786
2049	2.707	3.560	4.168	5.434	7.161	9.337	11.835	13.534	16.786
2050	2.711	3.569	4.163	5.432	7.158	9.351	11.833	13.507	16.795
2051	2.705	3.558	4.174	5.428	7.143	9.344	11.814	13.467	16.750
2052	2.710	3.560	4.169	5.434	7.144	9.343	11.798	13.465	16.746

2053	2.731	3.564	4.166	5.430	7.149	9.337	11.807	13.450	16.741
2054	2.740	3.578	4.178	5.425	7.152	9.325	11.817	13.476	16.749
2055	2.727	3.581	4.173	5.438	7.154	9.342	11.841	13.476	16.774
2056	2.737	3.572	4.170	5.444	7.157	9.352	11.848	13.473	16.744
2057	2.722	3.559	4.161	5.438	7.174	9.362	11.885	13.507	16.694

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	AVG F_WT_B	STD
2008	0.178	0.044
2009	0.144	0.019
2010	0.197	0.025
2011	0.199	0.041
2012	0.168	0.040
2013	0.160	0.036
2014	0.164	0.041
2015	0.168	0.043
2016	0.171	0.044
2017	0.173	0.044
2018	0.174	0.044
2019	0.175	0.044
2020	0.175	0.043
2021	0.176	0.043
2022	0.176	0.043
2023	0.176	0.043
2024	0.176	0.043
2025	0.176	0.043
2026	0.176	0.043
2027	0.176	0.043
2028	0.176	0.043
2029	0.176	0.043
2030	0.176	0.043
2031	0.176	0.043
2032	0.176	0.043
2033	0.176	0.043
2034	0.176	0.043
2035	0.176	0.043
2036	0.176	0.043
2037	0.176	0.043
2038	0.176	0.043
2039	0.176	0.043
2040	0.176	0.043
2041	0.176	0.043
2042	0.176	0.043
2043	0.176	0.043
2044	0.176	0.043
2045	0.176	0.043
2046	0.176	0.043
2047	0.176	0.043
2048	0.176	0.043
2049	0.176	0.043
2050	0.176	0.043
2051	0.176	0.043
2052	0.176	0.043
2053	0.176	0.043
2054	0.176	0.043
2055	0.176	0.043
2056	0.176	0.043
2057	0.176	0.043

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.096	0.114	0.126	0.147	0.173	0.205	0.234	0.257	0.300
2009	0.104	0.114	0.119	0.131	0.144	0.158	0.170	0.176	0.188
2010	0.128	0.153	0.164	0.182	0.199	0.215	0.227	0.234	0.246
2011	0.100	0.126	0.142	0.171	0.204	0.231	0.250	0.259	0.273
2012	0.086	0.105	0.117	0.138	0.166	0.197	0.222	0.235	0.254
2013	0.084	0.103	0.114	0.134	0.159	0.185	0.208	0.221	0.244
2014	0.081	0.101	0.113	0.135	0.162	0.192	0.219	0.235	0.262
2015	0.080	0.101	0.113	0.136	0.166	0.197	0.226	0.242	0.267

2016	0.080	0.102	0.115	0.139	0.169	0.201	0.230	0.245	0.270
2017	0.081	0.103	0.116	0.141	0.172	0.204	0.232	0.247	0.271
2018	0.081	0.104	0.117	0.142	0.173	0.205	0.233	0.248	0.272
2019	0.082	0.104	0.118	0.143	0.174	0.205	0.233	0.249	0.272
2020	0.083	0.105	0.119	0.144	0.174	0.206	0.233	0.249	0.271
2021	0.083	0.106	0.119	0.144	0.175	0.206	0.234	0.249	0.272
2022	0.083	0.106	0.120	0.144	0.175	0.206	0.234	0.249	0.272
2023	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2024	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2025	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2026	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2027	0.084	0.106	0.119	0.145	0.175	0.207	0.234	0.249	0.272
2028	0.083	0.106	0.119	0.145	0.175	0.207	0.234	0.249	0.272
2029	0.084	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2030	0.084	0.106	0.120	0.145	0.175	0.207	0.234	0.250	0.272
2031	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.250	0.273
2032	0.083	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.273
2033	0.084	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.273
2034	0.085	0.106	0.120	0.145	0.175	0.207	0.235	0.250	0.273
2035	0.084	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2036	0.084	0.107	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2037	0.083	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2038	0.083	0.106	0.119	0.145	0.175	0.207	0.234	0.249	0.272
2039	0.084	0.106	0.119	0.145	0.175	0.207	0.234	0.249	0.272
2040	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2041	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2042	0.083	0.106	0.119	0.144	0.175	0.207	0.234	0.249	0.272
2043	0.083	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.273
2044	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2045	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2046	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.273
2047	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2048	0.083	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.273
2049	0.083	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2050	0.083	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.272
2051	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.273
2052	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272
2053	0.084	0.106	0.120	0.145	0.175	0.207	0.234	0.249	0.273
2054	0.083	0.106	0.119	0.145	0.175	0.207	0.234	0.249	0.272
2055	0.083	0.106	0.119	0.144	0.175	0.207	0.234	0.249	0.273
2056	0.083	0.106	0.120	0.144	0.175	0.206	0.234	0.249	0.272
2057	0.084	0.106	0.120	0.145	0.175	0.206	0.234	0.249	0.272

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	8.008	1.824
2009	7.764	2.077
2010	7.690	2.041
2011	7.600	2.254
2012	7.640	2.693
2013	8.013	3.141
2014	8.407	3.453
2015	8.673	3.587
2016	8.871	3.641
2017	9.003	3.658
2018	9.084	3.662
2019	9.135	3.664
2020	9.166	3.663
2021	9.184	3.662
2022	9.193	3.659
2023	9.200	3.659
2024	9.206	3.660
2025	9.210	3.658
2026	9.214	3.657
2027	9.216	3.660
2028	9.216	3.667
2029	9.215	3.672
2030	9.213	3.673
2031	9.208	3.670
2032	9.198	3.659

2033	9.189	3.646
2034	9.180	3.639
2035	9.174	3.638
2036	9.171	3.636
2037	9.171	3.633
2038	9.173	3.637
2039	9.175	3.646
2040	9.178	3.654
2041	9.180	3.654
2042	9.181	3.649
2043	9.181	3.649
2044	9.182	3.651
2045	9.182	3.650
2046	9.184	3.648
2047	9.185	3.646
2048	9.185	3.647
2049	9.185	3.648
2050	9.183	3.647
2051	9.178	3.645
2052	9.173	3.639
2053	9.170	3.634
2054	9.172	3.631
2055	9.179	3.633
2056	9.187	3.637
2057	9.193	3.644

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	4.757	5.465	5.939	6.695	7.794	9.011	10.407	11.402	13.104
2009	4.153	4.940	5.431	6.308	7.504	8.865	10.445	11.610	13.885
2010	4.232	4.962	5.399	6.269	7.390	8.772	10.355	11.456	13.831
2011	4.001	4.685	5.122	5.996	7.218	8.759	10.562	11.910	14.659
2012	3.658	4.307	4.749	5.680	7.140	8.960	11.184	12.960	16.257
2013	3.430	4.092	4.574	5.698	7.431	9.597	12.315	14.193	17.721
2014	3.240	3.964	4.540	5.894	7.750	10.231	13.183	15.108	18.913
2015	3.133	3.960	4.620	6.064	8.026	10.630	13.598	15.578	19.469
2016	3.108	4.042	4.747	6.223	8.262	10.867	13.846	15.822	19.774
2017	3.128	4.124	4.847	6.342	8.399	11.019	14.008	15.936	19.905
2018	3.175	4.188	4.912	6.433	8.491	11.114	14.085	16.041	19.941
2019	3.214	4.237	4.953	6.484	8.544	11.163	14.131	16.043	20.038
2020	3.248	4.270	4.990	6.504	8.574	11.201	14.133	16.095	20.022
2021	3.266	4.283	5.015	6.513	8.596	11.217	14.163	16.156	20.018
2022	3.286	4.289	5.023	6.548	8.596	11.209	14.172	16.153	20.028
2023	3.288	4.309	5.029	6.556	8.603	11.219	14.179	16.150	20.050
2024	3.292	4.310	5.042	6.558	8.597	11.236	14.203	16.188	20.007
2025	3.296	4.305	5.047	6.572	8.613	11.229	14.221	16.169	20.034
2026	3.293	4.306	5.040	6.566	8.622	11.237	14.220	16.187	19.987
2027	3.293	4.302	5.043	6.557	8.626	11.238	14.250	16.209	19.957
2028	3.289	4.309	5.032	6.549	8.626	11.240	14.231	16.220	20.051
2029	3.280	4.316	5.043	6.538	8.630	11.233	14.252	16.274	20.084
2030	3.266	4.313	5.032	6.542	8.623	11.233	14.245	16.216	20.119
2031	3.274	4.305	5.035	6.543	8.597	11.245	14.222	16.190	20.111
2032	3.292	4.304	5.033	6.538	8.594	11.238	14.202	16.160	20.036
2033	3.295	4.310	5.033	6.547	8.587	11.208	14.191	16.146	19.894
2034	3.287	4.306	5.036	6.530	8.582	11.200	14.167	16.105	19.914
2035	3.289	4.308	5.028	6.531	8.574	11.191	14.138	16.066	19.944
2036	3.289	4.309	5.031	6.516	8.581	11.187	14.144	16.071	19.888
2037	3.282	4.303	5.030	6.525	8.577	11.182	14.150	16.082	19.908
2038	3.282	4.291	5.024	6.520	8.593	11.204	14.167	16.088	19.908
2039	3.270	4.297	5.018	6.513	8.588	11.211	14.146	16.097	19.934
2040	3.260	4.288	5.029	6.518	8.578	11.222	14.134	16.114	20.028
2041	3.275	4.306	5.027	6.524	8.587	11.211	14.179	16.109	20.092
2042	3.278	4.315	5.031	6.522	8.584	11.224	14.166	16.089	19.987
2043	3.264	4.312	5.038	6.530	8.572	11.235	14.167	16.143	19.940
2044	3.256	4.316	5.034	6.530	8.586	11.206	14.167	16.139	19.939
2045	3.266	4.314	5.022	6.533	8.593	11.206	14.154	16.080	20.006
2046	3.281	4.292	5.033	6.533	8.593	11.222	14.148	16.116	20.077
2047	3.291	4.298	5.027	6.544	8.596	11.214	14.113	16.092	19.934
2048	3.276	4.295	5.036	6.541	8.601	11.207	14.135	16.098	19.937
2049	3.274	4.293	5.030	6.540	8.600	11.197	14.160	16.126	19.970
2050	3.280	4.307	5.024	6.542	8.594	11.197	14.146	16.130	19.988

2051	3.270	4.290	5.031	6.533	8.582	11.212	14.124	16.097	19.983
2052	3.274	4.301	5.026	6.541	8.580	11.204	14.107	16.077	19.961
2053	3.298	4.300	5.024	6.536	8.581	11.196	14.110	16.060	19.977
2054	3.314	4.320	5.039	6.534	8.578	11.175	14.120	16.081	19.931
2055	3.295	4.327	5.040	6.543	8.591	11.198	14.148	16.065	19.933
2056	3.300	4.311	5.036	6.550	8.594	11.206	14.169	16.076	19.961
2057	3.289	4.294	5.021	6.544	8.612	11.215	14.199	16.110	19.875

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	3026.761	3420.549
2009	3023.312	3432.193
2010	3036.366	3435.158
2011	3018.012	3434.433
2012	3020.750	3410.340
2013	3000.485	3404.014
2014	3012.141	3404.940
2015	3029.563	3435.212
2016	3024.705	3435.613
2017	3022.415	3419.727
2018	3023.763	3407.274
2019	3002.355	3392.583
2020	3031.078	3434.556
2021	3030.326	3406.993
2022	3013.410	3399.835
2023	3028.730	3436.207
2024	3024.447	3432.975
2025	3029.012	3446.917
2026	3007.574	3394.385
2027	3026.926	3435.179
2028	3026.361	3427.548
2029	2996.131	3388.671
2030	3002.036	3393.543
2031	3006.081	3400.977
2032	3011.731	3404.418
2033	2996.726	3390.766
2034	3015.562	3431.743
2035	3011.386	3423.824
2036	3006.408	3399.569
2037	3020.208	3427.523
2038	3010.780	3393.826
2039	3004.409	3401.340
2040	3018.260	3418.536
2041	3013.845	3405.695
2042	2997.672	3396.252
2043	3029.839	3425.252
2044	3008.047	3418.102
2045	3011.479	3416.430
2046	3009.606	3402.718
2047	3019.225	3408.990
2048	3001.447	3392.223
2049	3001.943	3395.140
2050	2997.272	3382.759
2051	3015.099	3414.799
2052	3025.668	3423.056
2053	3022.274	3419.416
2054	3017.361	3413.892
2055	3015.849	3423.751
2056	3006.901	3403.662
2057	2995.910	3375.179

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	175.076	260.695	441.410	983.292	1657.420	4577.508	6898.777	8989.370	17662.225
2009	174.133	259.856	441.322	983.292	1647.358	4551.649	6898.955	8883.331	17682.082
2010	173.817	261.683	443.346	983.292	1663.875	4580.748	6898.828	8992.918	17778.978
2011	173.752	263.244	443.285	983.292	1641.916	4533.391	6896.639	8816.210	17909.089
2012	175.232	264.001	443.661	983.292	1652.911	4580.231	6896.427	8706.981	17648.505

2013	174.528	262.552	443.216	983.292	1635.834	4482.119	6895.337	8790.735	17586.648
2014	175.002	262.215	444.745	983.292	1649.853	4492.407	6898.112	8886.470	17540.463
2015	174.791	261.889	444.554	983.292	1657.330	4569.738	6899.398	8945.272	17786.332
2016	175.077	263.200	443.007	983.292	1650.658	4534.560	6896.577	8929.653	17822.106
2017	174.141	263.823	442.759	983.292	1655.195	4534.186	6898.127	8873.800	17710.802
2018	173.758	261.552	443.341	983.292	1660.603	4586.901	6897.286	8808.584	17677.738
2019	175.000	261.772	441.578	983.292	1656.584	4488.252	6895.483	8787.323	17597.546
2020	176.607	263.087	442.860	983.292	1657.800	4585.477	6896.685	8928.926	17756.620
2021	174.413	265.893	443.485	983.292	1666.171	4594.031	6896.926	8802.957	17638.088
2022	173.390	260.517	441.899	983.292	1643.442	4571.707	6898.032	8644.510	17567.396
2023	173.607	262.002	442.867	983.292	1658.195	4522.132	6898.635	9020.475	17684.219
2024	175.539	262.657	442.574	983.292	1651.049	4543.442	6898.399	8913.555	17767.991
2025	174.937	260.574	440.600	983.292	1651.107	4539.344	6899.489	8970.255	17798.769
2026	173.087	260.858	441.657	983.292	1653.487	4522.138	6897.112	8753.584	17563.453
2027	174.872	262.029	441.463	983.292	1647.529	4581.039	6899.963	9013.002	17759.210
2028	175.135	265.159	443.917	983.292	1658.261	4569.442	6898.840	8941.189	17720.357
2029	174.597	261.279	441.052	983.292	1646.976	4492.052	6895.734	8703.616	17535.251
2030	173.890	263.002	442.756	983.292	1639.410	4523.469	6895.619	8769.600	17581.981
2031	173.786	260.921	441.967	983.292	1652.914	4503.712	6895.856	8636.539	17629.988
2032	175.276	262.626	441.276	983.292	1647.070	4536.013	6897.608	8794.929	17645.948
2033	173.763	261.015	441.854	983.292	1639.507	4486.260	6895.537	8761.191	17557.901
2034	174.328	260.591	439.889	983.292	1640.564	4503.425	6897.737	8921.098	17800.634
2035	174.080	258.516	437.819	983.292	1643.040	4490.747	6896.822	9018.087	17588.341
2036	173.779	261.400	444.028	983.292	1651.490	4523.396	6896.740	8683.517	17668.455
2037	173.855	261.799	443.672	983.292	1651.523	4516.624	6898.298	9002.420	17680.643
2038	174.267	264.576	443.348	983.292	1659.732	4525.505	6896.083	8634.445	17676.580
2039	174.914	261.737	441.506	983.292	1641.951	4506.070	6896.162	8768.735	17575.262
2040	174.382	259.960	440.953	983.292	1646.803	4541.257	6899.568	8861.725	17622.418
2041	172.036	263.243	444.073	983.292	1651.796	4522.790	6895.902	8856.186	17598.802
2042	172.863	262.282	442.571	983.292	1652.552	4471.988	6894.437	8692.034	17644.493
2043	174.793	262.536	443.618	983.292	1661.953	4539.865	6897.697	9002.554	17770.390
2044	174.105	263.237	442.279	983.292	1636.621	4485.548	6896.334	8955.537	17663.828
2045	173.215	260.184	441.231	983.292	1642.004	4491.888	6897.774	8857.490	17701.248
2046	174.501	262.766	441.463	983.292	1648.161	4528.542	6896.055	8699.594	17718.327
2047	174.572	262.327	445.045	983.292	1654.763	4560.260	6897.248	8811.798	17635.941
2048	173.342	261.431	439.304	983.292	1646.057	4494.406	6895.481	8634.981	17626.595
2049	173.393	261.844	443.434	983.292	1651.708	4482.785	6896.652	8749.465	17559.019
2050	174.536	261.079	440.822	983.292	1648.327	4513.901	6896.212	8589.131	17592.807
2051	174.433	262.525	441.633	983.292	1648.862	4530.433	6897.228	8777.346	17732.568
2052	173.360	259.709	440.565	983.292	1650.565	4587.523	6898.169	8893.220	17703.930
2053	176.136	264.816	445.334	983.292	1653.044	4547.365	6897.769	8944.408	17744.460
2054	172.815	260.717	442.727	983.292	1645.454	4539.993	6897.345	8869.050	17576.941
2055	174.092	262.049	441.567	983.292	1631.428	4538.680	6898.407	8922.886	17703.670
2056	173.529	262.057	441.606	983.292	1643.110	4509.071	6896.042	8697.885	17643.267
2057	173.543	262.228	443.518	983.292	1650.384	4500.710	6894.740	8621.326	17568.666

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	1.197	0.000
2009	0.989	0.261
2010	1.307	0.359
2011	1.275	0.388
2012	1.061	0.298
2013	1.080	0.364
2014	1.193	0.528
2015	1.263	0.585
2016	1.314	0.608
2017	1.347	0.616
2018	1.366	0.618
2019	1.377	0.617
2020	1.385	0.618
2021	1.391	0.618
2022	1.393	0.618
2023	1.395	0.617
2024	1.395	0.616
2025	1.396	0.616
2026	1.397	0.618
2027	1.398	0.616
2028	1.397	0.616
2029	1.398	0.619
2030	1.398	0.619

2031	1.398	0.620
2032	1.397	0.619
2033	1.396	0.619
2034	1.395	0.617
2035	1.392	0.613
2036	1.391	0.613
2037	1.391	0.614
2038	1.391	0.613
2039	1.391	0.612
2040	1.391	0.615
2041	1.392	0.617
2042	1.392	0.617
2043	1.393	0.617
2044	1.393	0.615
2045	1.392	0.615
2046	1.393	0.616
2047	1.393	0.616
2048	1.393	0.614
2049	1.394	0.615
2050	1.393	0.616
2051	1.393	0.616
2052	1.393	0.615
2053	1.392	0.615
2054	1.391	0.614
2055	1.390	0.612
2056	1.391	0.613
2057	1.393	0.614

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1.197	1.197	1.197	1.197	1.197	1.197	1.197	1.197	1.197
2009	0.506	0.603	0.685	0.804	0.962	1.136	1.326	1.471	1.725
2010	0.686	0.819	0.900	1.052	1.265	1.502	1.770	1.968	2.345
2011	0.666	0.789	0.861	1.009	1.206	1.458	1.753	2.019	2.481
2012	0.574	0.673	0.732	0.853	1.013	1.213	1.461	1.629	1.973
2013	0.557	0.644	0.701	0.821	1.004	1.258	1.541	1.778	2.331
2014	0.495	0.588	0.654	0.803	1.078	1.437	1.880	2.245	2.977
2015	0.457	0.559	0.637	0.829	1.148	1.549	2.047	2.417	3.143
2016	0.441	0.557	0.649	0.869	1.198	1.626	2.133	2.513	3.218
2017	0.439	0.569	0.669	0.898	1.233	1.664	2.168	2.547	3.285
2018	0.439	0.582	0.684	0.914	1.255	1.686	2.198	2.564	3.300
2019	0.445	0.591	0.696	0.928	1.264	1.700	2.201	2.577	3.289
2020	0.453	0.596	0.701	0.935	1.275	1.707	2.213	2.579	3.302
2021	0.456	0.602	0.707	0.941	1.281	1.711	2.218	2.587	3.329
2022	0.460	0.605	0.710	0.942	1.284	1.716	2.216	2.592	3.319
2023	0.463	0.606	0.713	0.945	1.285	1.717	2.221	2.591	3.326
2024	0.462	0.606	0.712	0.947	1.285	1.715	2.219	2.590	3.312
2025	0.464	0.608	0.715	0.947	1.286	1.714	2.219	2.598	3.308
2026	0.464	0.609	0.714	0.948	1.286	1.716	2.228	2.598	3.323
2027	0.465	0.607	0.714	0.950	1.288	1.718	2.224	2.593	3.318
2028	0.462	0.609	0.714	0.949	1.287	1.718	2.228	2.592	3.303
2029	0.462	0.608	0.713	0.949	1.287	1.719	2.229	2.606	3.325
2030	0.463	0.609	0.713	0.944	1.288	1.719	2.233	2.608	3.317
2031	0.461	0.609	0.713	0.945	1.287	1.717	2.235	2.612	3.334
2032	0.459	0.607	0.713	0.946	1.285	1.719	2.227	2.601	3.328
2033	0.462	0.608	0.714	0.945	1.284	1.717	2.228	2.603	3.326
2034	0.465	0.609	0.713	0.947	1.281	1.716	2.225	2.592	3.301
2035	0.464	0.608	0.714	0.945	1.279	1.713	2.218	2.584	3.285
2036	0.462	0.608	0.713	0.944	1.282	1.712	2.215	2.580	3.299
2037	0.465	0.608	0.711	0.943	1.282	1.712	2.211	2.588	3.313
2038	0.461	0.609	0.712	0.943	1.280	1.712	2.219	2.575	3.286
2039	0.463	0.608	0.712	0.944	1.281	1.712	2.215	2.580	3.284
2040	0.459	0.607	0.712	0.942	1.283	1.714	2.213	2.579	3.305
2041	0.458	0.607	0.711	0.941	1.281	1.714	2.219	2.582	3.318
2042	0.458	0.606	0.714	0.942	1.282	1.713	2.213	2.586	3.326
2043	0.461	0.607	0.713	0.943	1.281	1.714	2.219	2.587	3.329
2044	0.459	0.610	0.714	0.942	1.282	1.717	2.219	2.587	3.296
2045	0.459	0.609	0.713	0.944	1.281	1.714	2.220	2.590	3.301
2046	0.459	0.610	0.711	0.945	1.281	1.712	2.222	2.588	3.310
2047	0.461	0.609	0.712	0.944	1.282	1.713	2.219	2.578	3.311
2048	0.462	0.605	0.712	0.946	1.284	1.714	2.213	2.581	3.306

2049	0.463	0.608	0.712	0.945	1.285	1.716	2.211	2.587	3.308
2050	0.462	0.606	0.712	0.945	1.284	1.712	2.218	2.585	3.312
2051	0.459	0.607	0.713	0.946	1.284	1.711	2.219	2.589	3.310
2052	0.459	0.607	0.713	0.945	1.285	1.712	2.215	2.579	3.304
2053	0.461	0.606	0.713	0.944	1.282	1.713	2.213	2.579	3.302
2054	0.462	0.606	0.711	0.946	1.281	1.710	2.204	2.574	3.302
2055	0.464	0.607	0.712	0.944	1.281	1.708	2.210	2.579	3.294
2056	0.464	0.612	0.714	0.943	1.284	1.709	2.214	2.577	3.306
2057	0.464	0.610	0.714	0.946	1.282	1.712	2.215	2.585	3.326

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	1287.	1330.	1355.	1400.	1450.	1500.	1538.	1570.	1613.
2	32.	52.	73.	130.	224.	379.	593.	820.	1550.
3	919.	1274.	1494.	2021.	2953.	4057.	5667.	6904.	9174.
4	565.	688.	796.	1039.	1368.	1821.	2407.	2756.	3690.
5	98.	128.	154.	195.	254.	323.	405.	467.	615.
6	807.	1018.	1165.	1453.	1823.	2262.	2709.	3124.	3738.
7	60.	74.	90.	110.	144.	187.	232.	265.	341.
8	73.	104.	121.	154.	192.	242.	290.	314.	367.
9+	1.	1.	1.	6.	27.	53.	76.	94.	129.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	174.	262.	442.	983.	1643.	4509.	6896.	8698.	17643.
2	142.	214.	361.	803.	1333.	3708.	5635.	7289.	14462.
3	115.	173.	295.	654.	1095.	3021.	4589.	5901.	11695.
4	94.	141.	238.	525.	882.	2427.	3682.	4774.	9472.
5	70.	104.	177.	395.	664.	1845.	2774.	3576.	7118.
6	48.	73.	122.	272.	457.	1254.	1910.	2430.	4909.
7	29.	43.	72.	161.	271.	741.	1132.	1410.	2887.
8	17.	25.	43.	96.	161.	436.	671.	851.	1708.
9+	111.	151.	180.	248.	370.	541.	734.	895.	1280.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.335	0.093
2009	0.261	0.000
2010	0.323	0.000
2011	0.323	0.000
2012	0.323	0.000
2013	0.323	0.000
2014	0.323	0.000
2015	0.323	0.000
2016	0.323	0.000
2017	0.323	0.000
2018	0.323	0.000
2019	0.323	0.000
2020	0.323	0.000
2021	0.323	0.000
2022	0.323	0.000
2023	0.323	0.000
2024	0.323	0.000
2025	0.323	0.000
2026	0.323	0.000
2027	0.323	0.000
2028	0.323	0.000
2029	0.323	0.000
2030	0.323	0.000
2031	0.323	0.000
2032	0.323	0.000
2033	0.323	0.000
2034	0.323	0.000
2035	0.323	0.000
2036	0.323	0.000
2037	0.323	0.000
2038	0.323	0.000
2039	0.323	0.000
2040	0.323	0.000
2041	0.323	0.000
2042	0.323	0.000

2043	0.323	0.000
2044	0.323	0.000
2045	0.323	0.000
2046	0.323	0.000
2047	0.323	0.000
2048	0.323	0.000
2049	0.323	0.000
2050	0.323	0.000
2051	0.323	0.000
2052	0.323	0.000
2053	0.323	0.000
2054	0.323	0.000
2055	0.323	0.000
2056	0.323	0.000
2057	0.323	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.176	0.210	0.231	0.271	0.320	0.386	0.451	0.510	0.617
2009	0.261	0.261	0.261	0.261	0.261	0.261	0.261	0.261	0.261
2010	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2011	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2012	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2013	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2014	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2015	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2016	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2017	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2018	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2019	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2020	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2021	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2022	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2023	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2024	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2025	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2026	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2027	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2028	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2029	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2030	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2031	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2032	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2033	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2034	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2035	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2036	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2037	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2038	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2039	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2040	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2041	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2042	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2043	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2044	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2045	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2046	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2047	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2048	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2049	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2050	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2051	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2052	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2053	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2054	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2055	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2056	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
2057	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323

Georges Bank Yellowtail Flounder (High DFO survey years included)

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AGEPRO VERSION 3.3

 PROJECTION RUN: gbyt 6+ no2008DFO survey Frebuild (75% prob SSB>SSBmsy in 2014)

 INPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\CGBYT\PDT_TRAC\C_GBYT_NEWEST08CAT_1500_HIGH_4.IN
 OUTPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\CGBYT\PDT_TRAC\C_GBYT_NEWEST08CAT_1500_HIGH_4.OUT
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:   10
 TOTAL NUMBER OF SIMULATIONS:   10000
 NUMBER OF FEASIBLE SIMULATIONS:   10000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:   1.00000000000000
 NUMBER OF BOOTSTRAP REALIZATIONS:   1000

 NUMBER OF RECRUITMENT MODELS:   1
 PROBABLE RECRUITMENT MODELS:   15
 RECRUITMENT MODELS BY YEAR
 YEAR    RECRUITMENT MODELS
   2009  15
   2010  15
   2011  15
   2012  15
   2013  15
   2014  15
   2015  15
   2016  15
   2017  15
   2018  15
   2019  15
   2020  15
   2021  15
   2022  15
   2023  15
   2024  15
   2025  15
   2026  15
   2027  15
   2028  15
   2029  15
   2030  15
   2031  15
   2032  15
   2033  15

 RECRUITMENT MODEL PROBABILITIES BY YEAR
 YEAR    MODEL PROBABILITY
   2009  1.00000000000000
   2010  1.00000000000000
   2011  1.00000000000000
   2012  1.00000000000000
   2013  1.00000000000000
   2014  1.00000000000000
   2015  1.00000000000000
   2016  1.00000000000000
   2017  1.00000000000000
   2018  1.00000000000000
   2019  1.00000000000000
   2020  1.00000000000000
   2021  1.00000000000000
   2022  1.00000000000000
   2023  1.00000000000000
   2024  1.00000000000000
   2025  1.00000000000000
   2026  1.00000000000000
   2027  1.00000000000000
   2028  1.00000000000000
   2029  1.00000000000000
   2030  1.00000000000000
   2031  1.00000000000000
   2032  1.00000000000000
   2033  1.00000000000000
```

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2009	10000
2010	10000
2011	10000
2012	10000
2013	10000
2014	10000
2015	10000
2016	10000
2017	10000
2018	10000
2019	10000
2020	10000
2021	10000
2022	10000
2023	10000
2024	10000
2025	10000
2026	10000
2027	10000
2028	10000
2029	10000
2030	10000
2031	10000
2032	10000
2033	10000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2009		2.100
2010		1.500
2011	0.048	
2012	0.048	
2013	0.048	
2014	0.048	
2015	0.048	
2016	0.048	
2017	0.048	
2018	0.048	
2019	0.048	
2020	0.048	
2021	0.048	
2022	0.048	
2023	0.048	
2024	0.048	
2025	0.048	
2026	0.048	
2027	0.048	
2028	0.048	
2029	0.048	
2030	0.048	
2031	0.048	
2032	0.048	
2033	0.048	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2009	30.466	5.450
2010	35.078	6.460
2011	41.997	7.581
2012	47.939	9.891
2013	52.777	12.020
2014	58.463	14.114
2015	64.233	16.232
2016	68.763	17.400
2017	72.310	17.980
2018	75.074	18.303
2019	77.257	18.511
2020	78.941	18.613

2021	80.215	18.647
2022	81.250	18.669
2023	82.054	18.679
2024	82.674	18.616
2025	83.229	18.564
2026	83.671	18.625
2027	83.993	18.640
2028	84.226	18.669
2029	84.383	18.819
2030	84.551	18.920
2031	84.685	18.959
2032	84.737	18.996
2033	84.771	18.953

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	20.272	22.483	23.978	26.652	29.741	33.918	37.680	40.183	44.919
2010	23.039	25.578	27.373	30.600	34.125	39.092	43.753	46.584	51.986
2011	27.797	30.855	32.870	36.496	41.171	46.832	52.284	55.484	62.444
2012	30.399	34.072	36.413	40.448	46.597	54.137	61.537	66.033	74.626
2013	31.993	36.238	38.582	43.594	51.207	60.391	69.241	74.973	85.290
2014	34.315	38.591	41.476	47.550	56.779	67.346	77.873	84.178	95.513
2015	36.244	41.175	44.425	51.977	62.335	74.747	86.418	93.421	107.759
2016	37.815	43.501	47.302	55.758	66.871	79.735	92.495	100.118	115.590
2017	39.564	45.705	50.043	58.945	70.725	83.954	96.256	104.278	119.484
2018	41.134	47.790	52.335	61.504	73.365	87.000	99.477	107.164	122.969
2019	42.514	49.532	54.435	63.717	75.729	89.126	102.219	110.236	125.109
2020	43.717	51.102	55.773	65.478	77.438	90.931	103.726	112.226	127.275
2021	44.875	52.062	56.891	66.472	78.748	92.237	105.019	113.541	129.351
2022	45.368	53.028	57.941	67.721	79.909	93.086	105.976	114.473	130.259
2023	46.002	53.813	58.691	68.612	80.717	94.166	106.852	115.005	131.247
2024	46.776	54.304	59.163	69.252	81.321	94.854	107.675	115.754	130.224
2025	46.970	54.704	59.754	69.944	82.208	95.340	107.940	115.493	130.903
2026	47.401	54.853	60.120	70.460	82.521	95.775	108.371	116.450	130.885
2027	47.415	55.407	60.476	70.726	82.844	96.080	108.946	116.944	132.159
2028	47.309	55.684	60.957	70.614	82.931	96.352	109.076	117.199	131.012
2029	47.642	55.967	60.895	70.793	82.997	96.603	109.889	117.742	132.150
2030	48.351	55.981	60.987	70.849	82.953	96.640	109.954	118.210	133.648
2031	48.460	56.076	61.253	70.861	83.172	96.813	110.017	118.608	133.462
2032	48.204	55.878	60.996	70.766	83.459	96.881	110.013	118.698	133.938
2033	48.171	55.952	61.185	70.764	83.578	97.146	110.048	118.121	132.637

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 43.200 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	0.025
2010	0.114
2011	0.401
2012	0.641
2013	0.761
2014	0.862
2015	0.919
2016	0.953
2017	0.971
2018	0.983
2019	0.988
2020	0.992
2021	0.993
2022	0.995
2023	0.996
2024	0.996
2025	0.997
2026	0.997
2027	0.997
2028	0.998
2029	0.998
2030	0.998
2031	0.998
2032	0.998
2033	0.999

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2009	33.268	5.809
2010	40.321	6.969
2011	49.570	9.718
2012	55.554	11.778
2013	60.220	13.523
2014	65.778	15.394
2015	71.498	17.264
2016	75.992	18.280
2017	79.457	18.830
2018	82.167	19.137
2019	84.276	19.319
2020	85.914	19.402
2021	87.216	19.438
2022	88.235	19.478
2023	89.014	19.416
2024	89.663	19.358
2025	90.207	19.401
2026	90.617	19.438
2027	90.908	19.429
2028	91.122	19.533
2029	91.342	19.682
2030	91.503	19.751
2031	91.587	19.764
2032	91.612	19.751
2033	91.688	19.683

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	22.395	24.673	26.332	29.215	32.432	36.804	41.043	43.590	48.451
2010	27.296	30.103	31.865	35.323	39.530	44.718	49.775	52.819	59.126
2011	31.907	35.783	37.986	42.277	48.438	55.737	62.733	67.327	75.918
2012	34.461	39.055	41.692	46.642	54.187	63.057	71.640	77.260	87.215
2013	36.255	40.935	43.989	49.873	58.687	68.800	78.707	85.086	95.989
2014	38.836	43.712	47.049	54.202	63.998	75.742	86.695	93.706	106.531
2015	40.543	46.436	50.288	58.585	69.674	82.548	95.077	102.320	116.992
2016	42.517	48.888	53.513	62.529	74.359	87.725	100.701	108.428	125.041
2017	44.294	51.237	56.131	65.672	77.757	91.803	104.780	112.633	128.727
2018	46.063	53.265	58.599	68.130	80.571	94.625	107.917	115.821	131.654
2019	47.412	55.053	60.262	70.232	82.876	96.573	110.129	118.335	134.324
2020	48.764	56.544	61.676	71.648	84.606	98.307	111.599	120.285	136.561
2021	49.572	57.675	62.897	73.091	85.954	99.383	113.166	121.475	137.825
2022	50.178	58.676	63.876	74.271	87.038	100.600	114.206	122.760	139.069
2023	50.955	59.298	64.521	75.105	87.679	101.362	114.892	123.299	139.274
2024	51.521	59.814	65.189	75.814	88.510	102.282	115.433	123.772	138.683
2025	51.815	59.936	65.789	76.533	89.143	102.844	115.994	124.182	139.884
2026	51.767	60.536	66.005	76.745	89.425	103.218	116.564	124.878	140.753
2027	51.851	60.758	66.620	76.813	89.724	103.714	116.680	125.294	139.971
2028	52.150	61.269	66.740	76.993	89.690	103.893	117.358	125.470	140.588
2029	53.203	61.159	66.789	77.301	89.912	104.063	117.713	126.045	141.632
2030	53.549	61.675	66.919	77.217	90.088	104.134	117.860	126.812	142.225
2031	53.023	61.382	66.850	77.329	90.282	104.518	118.050	126.750	142.294
2032	52.830	61.345	66.973	77.144	90.346	104.552	117.900	126.691	141.891
2033	53.353	61.673	67.022	77.360	90.341	104.593	117.692	126.255	141.297

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000

2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2009	0.065	0.011
2010	0.038	0.007
2011	0.036	0.004
2012	0.035	0.004
2013	0.036	0.004
2014	0.037	0.004
2015	0.038	0.004
2016	0.039	0.004
2017	0.039	0.003
2018	0.039	0.003
2019	0.039	0.003
2020	0.040	0.003
2021	0.040	0.003
2022	0.040	0.003
2023	0.040	0.003
2024	0.040	0.003
2025	0.040	0.003
2026	0.040	0.003
2027	0.040	0.003
2028	0.040	0.003
2029	0.040	0.003
2030	0.040	0.003
2031	0.040	0.003
2032	0.040	0.003
2033	0.040	0.003

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	0.043	0.048	0.051	0.057	0.065	0.072	0.080	0.085	0.094
2010	0.025	0.028	0.030	0.034	0.038	0.042	0.047	0.050	0.055
2011	0.026	0.029	0.030	0.033	0.037	0.039	0.041	0.041	0.042
2012	0.027	0.029	0.030	0.033	0.036	0.038	0.040	0.041	0.042
2013	0.027	0.030	0.031	0.034	0.037	0.039	0.041	0.042	0.043
2014	0.028	0.031	0.032	0.035	0.038	0.040	0.042	0.043	0.044
2015	0.029	0.032	0.033	0.036	0.038	0.041	0.042	0.043	0.044
2016	0.030	0.032	0.034	0.036	0.039	0.041	0.043	0.044	0.045
2017	0.030	0.033	0.034	0.037	0.039	0.042	0.043	0.044	0.045
2018	0.031	0.033	0.035	0.037	0.040	0.042	0.043	0.044	0.045
2019	0.031	0.033	0.035	0.037	0.040	0.042	0.043	0.044	0.045
2020	0.031	0.034	0.035	0.038	0.040	0.042	0.044	0.044	0.045
2021	0.032	0.034	0.035	0.038	0.040	0.042	0.044	0.044	0.045
2022	0.032	0.034	0.035	0.038	0.040	0.042	0.044	0.044	0.045
2023	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2024	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2025	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2026	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2027	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2028	0.032	0.035	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2029	0.032	0.035	0.036	0.038	0.041	0.042	0.044	0.044	0.045
2030	0.032	0.035	0.036	0.038	0.040	0.042	0.044	0.044	0.045
2031	0.032	0.035	0.036	0.038	0.041	0.042	0.044	0.044	0.045

2032	0.032	0.035	0.036	0.038	0.041	0.043	0.044	0.044	0.045
2033	0.032	0.035	0.036	0.038	0.041	0.043	0.044	0.044	0.045

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2009	29.123	5.141
2010	32.848	6.089
2011	39.625	7.334
2012	46.323	9.652
2013	50.753	11.716
2014	56.319	13.609
2015	62.724	16.190
2016	67.713	17.714
2017	71.662	18.412
2018	74.709	18.802
2019	77.122	19.050
2020	79.038	19.184
2021	80.426	19.235
2022	81.558	19.243
2023	82.476	19.290
2024	83.130	19.269
2025	83.715	19.135
2026	84.240	19.210
2027	84.572	19.250
2028	84.885	19.200
2029	85.026	19.362
2030	85.191	19.504
2031	85.371	19.523
2032	85.435	19.599
2033	85.483	19.576

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	19.414	21.732	22.936	25.476	28.393	32.319	35.850	38.219	42.890
2010	21.422	23.849	25.599	28.630	31.996	36.662	41.004	43.624	48.697
2011	25.991	28.813	30.944	34.479	38.572	44.277	49.467	52.478	58.890
2012	29.313	32.810	34.961	39.067	44.948	52.418	59.676	63.853	72.610
2013	30.895	34.574	36.991	41.721	49.151	58.266	66.963	72.525	82.498
2014	32.995	37.380	39.951	45.822	54.798	64.744	75.226	81.310	92.836
2015	35.250	39.722	42.894	50.360	60.957	73.131	85.050	92.166	105.900
2016	36.786	42.228	45.915	54.424	65.529	79.016	91.842	99.965	114.491
2017	38.738	44.731	48.790	58.023	70.004	83.489	96.603	104.671	120.041

2018	40.085	46.929	51.280	60.786	72.854	87.120	99.822	107.816	124.113
2019	41.758	48.532	53.544	63.069	75.510	89.418	103.048	110.897	126.254
2020	43.112	50.364	55.389	65.018	77.484	91.340	104.934	112.990	128.785
2021	44.120	51.668	56.485	66.356	78.826	92.782	106.319	114.364	130.237
2022	45.000	52.493	57.590	67.397	80.200	93.841	107.209	115.549	132.010
2023	45.635	53.298	58.453	68.689	81.135	94.836	108.180	116.511	133.118
2024	46.319	53.736	58.914	69.005	81.704	95.793	108.826	117.406	132.560
2025	46.849	54.401	59.617	69.901	82.383	96.187	109.370	117.323	132.750
2026	47.022	54.569	59.810	70.623	83.024	96.888	109.826	117.924	133.454
2027	47.121	54.899	60.124	70.711	83.380	97.028	110.385	118.258	134.108
2028	47.220	55.382	60.783	70.997	83.589	97.295	110.706	119.000	133.881
2029	46.717	55.547	61.014	71.007	83.445	97.517	110.941	119.409	134.440
2030	47.822	55.627	60.909	71.080	83.733	97.619	111.244	119.889	135.325
2031	48.274	55.981	61.138	71.210	83.746	97.826	111.569	120.221	136.301
2032	48.134	55.846	61.281	71.164	83.936	98.057	111.803	120.753	135.568
2033	48.198	55.533	61.049	71.097	84.313	98.228	111.806	120.068	135.453

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2009	39153.612	28864.309
2010	39406.439	29383.242
2011	38854.954	28997.361
2012	38615.696	28832.183
2013	38692.652	28784.968
2014	39221.171	29078.611
2015	39018.137	28975.290
2016	39031.924	29112.955
2017	38983.557	28870.130
2018	38639.563	28698.265
2019	38946.714	28655.211
2020	39128.261	29137.288
2021	38881.959	28957.247
2022	39074.629	28864.612
2023	39295.610	29223.248
2024	38962.281	29175.134
2025	39131.472	28715.651
2026	38646.466	29045.789
2027	39116.714	29173.191
2028	39263.625	29212.280

2029	38984.861	28944.670
2030	38796.254	28800.127
2031	38787.155	28830.746
2032	39315.694	29292.675
2033	39389.528	29098.826

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	7830.590	10647.100	11703.324	20056.045	24677.255	54126.267	87946.452	100859.232	116856.389
2010	7959.884	10649.097	11742.933	20010.579	24654.714	54128.508	91098.334	100866.709	117308.426
2011	7735.965	10604.303	11591.468	19971.416	24621.780	53676.084	88562.605	100866.231	116837.748
2012	7473.212	10630.806	11691.047	19925.058	24626.253	53385.438	88062.377	100858.839	117873.614
2013	7808.663	10660.269	11707.544	19979.808	24653.067	53436.400	88428.787	100856.503	117620.019
2014	7719.024	10612.864	11651.138	20073.085	24672.138	54074.367	89239.193	100862.926	117286.622
2015	7491.798	10672.047	11794.497	20005.100	24674.444	53744.441	89039.070	100861.341	117869.587
2016	7689.520	10616.647	11546.885	19924.585	24651.156	53980.194	89867.767	100860.049	117216.966
2017	7710.344	10672.566	11693.919	20015.557	24673.160	53660.727	88551.776	100865.199	116943.943
2018	7788.736	10645.325	11676.130	19935.926	24642.527	53490.836	88571.356	100853.752	116364.405
2019	7882.938	10693.183	11739.024	20027.157	24635.950	53739.493	87582.672	100858.843	116702.060
2020	7757.626	10628.261	11573.563	19974.828	24662.809	54111.858	89311.452	100866.268	117075.670
2021	7660.594	10603.238	11685.673	19953.650	24628.695	53624.295	88210.729	100862.673	117898.841
2022	7678.389	10639.201	11620.854	20022.431	24675.036	53982.924	87689.795	100860.918	117722.675
2023	7829.245	10652.270	11717.812	20019.863	24676.459	54051.864	89545.501	100861.045	117217.965
2024	7687.815	10627.629	11627.403	19936.044	24636.777	53571.674	89647.169	100869.919	118351.679
2025	7785.150	10655.735	11825.482	20072.283	24682.446	53825.826	88166.740	100860.406	116636.844
2026	7563.671	10561.927	11408.989	19918.381	24603.545	53599.278	89291.823	100862.196	117261.943
2027	7584.265	10613.665	11635.444	19943.981	24646.117	53782.708	89709.896	100860.748	117686.223
2028	7962.839	10662.036	11855.152	20049.222	24654.967	54017.719	89332.963	100871.711	119312.700
2029	7816.114	10672.380	11631.343	20024.288	24649.416	53872.644	88587.951	100861.027	117126.512
2030	7667.963	10665.174	11717.976	19927.126	24632.236	53768.640	87637.064	100859.968	116181.528
2031	7839.599	10628.007	11720.185	20009.956	24622.538	53540.004	87892.827	100861.129	117714.962
2032	7602.983	10661.404	11662.412	20045.505	24680.711	53860.601	90552.083	100865.107	117555.055
2033	7883.042	10667.003	11725.321	20056.387	24680.765	54283.884	89551.008	100865.882	117284.581

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2009	2.100	0.000
2010	1.500	0.000
2011	1.767	0.327
2012	1.942	0.351
2013	2.171	0.472
2014	2.442	0.589
2015	2.715	0.698
2016	2.927	0.759
2017	3.092	0.791
2018	3.223	0.806
2019	3.326	0.816
2020	3.407	0.822
2021	3.468	0.824
2022	3.514	0.825
2023	3.552	0.825
2024	3.582	0.825
2025	3.607	0.823
2026	3.627	0.820
2027	3.644	0.822
2028	3.655	0.826
2029	3.664	0.829
2030	3.669	0.834
2031	3.675	0.837
2032	3.680	0.839
2033	3.682	0.840

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100
2010	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
2011	1.161	1.287	1.377	1.533	1.723	1.975	2.208	2.354	2.649
2012	1.283	1.434	1.521	1.684	1.907	2.165	2.422	2.573	2.869
2013	1.357	1.528	1.627	1.815	2.099	2.464	2.832	3.052	3.440
2014	1.457	1.643	1.748	1.986	2.356	2.815	3.260	3.544	4.045

2015	1.542	1.744	1.872	2.176	2.629	3.165	3.677	3.986	4.571
2016	1.612	1.842	1.999	2.357	2.837	3.420	3.969	4.287	4.938
2017	1.683	1.945	2.120	2.500	3.005	3.593	4.174	4.517	5.177
2018	1.761	2.032	2.226	2.626	3.153	3.753	4.302	4.657	5.351
2019	1.828	2.115	2.323	2.721	3.254	3.861	4.429	4.767	5.459
2020	1.880	2.185	2.394	2.802	3.340	3.928	4.520	4.862	5.517
2021	1.934	2.237	2.442	2.863	3.399	3.995	4.584	4.933	5.619
2022	1.968	2.283	2.485	2.904	3.453	4.040	4.614	4.991	5.695
2023	1.993	2.316	2.530	2.949	3.492	4.081	4.647	5.018	5.718
2024	2.019	2.333	2.546	2.982	3.519	4.123	4.687	5.038	5.703
2025	2.048	2.355	2.568	3.012	3.542	4.148	4.719	5.061	5.686
2026	2.044	2.376	2.596	3.041	3.574	4.162	4.726	5.061	5.734
2027	2.058	2.387	2.600	3.052	3.588	4.179	4.727	5.088	5.764
2028	2.054	2.402	2.626	3.048	3.601	4.188	4.768	5.131	5.784
2029	2.056	2.412	2.634	3.062	3.596	4.199	4.777	5.148	5.757
2030	2.097	2.405	2.638	3.063	3.602	4.212	4.784	5.165	5.821
2031	2.101	2.422	2.638	3.066	3.601	4.209	4.795	5.175	5.864
2032	2.098	2.419	2.642	3.069	3.614	4.221	4.807	5.181	5.868
2033	2.098	2.421	2.633	3.058	3.630	4.220	4.815	5.175	5.850

REALIZED F SERIES

YEAR	AVG F	STD
2009	0.086	0.015
2010	0.048	0.009
2011	0.048	0.000
2012	0.048	0.000
2013	0.048	0.000
2014	0.048	0.000
2015	0.048	0.000
2016	0.048	0.000
2017	0.048	0.000
2018	0.048	0.000
2019	0.048	0.000
2020	0.048	0.000
2021	0.048	0.000
2022	0.048	0.000
2023	0.048	0.000
2024	0.048	0.000
2025	0.048	0.000
2026	0.048	0.000
2027	0.048	0.000
2028	0.048	0.000
2029	0.048	0.000
2030	0.048	0.000
2031	0.048	0.000
2032	0.048	0.000
2033	0.048	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	0.055	0.063	0.068	0.075	0.086	0.096	0.107	0.113	0.126
2010	0.031	0.035	0.037	0.042	0.048	0.054	0.060	0.064	0.072
2011	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2012	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2013	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2014	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2015	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2016	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2017	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2018	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2019	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2020	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2021	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2022	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2023	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2024	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2025	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2026	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2027	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2028	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2029	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048

2030	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2031	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2032	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
2033	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.250

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000

Georges Bank Yellowtail Flounder (High DFO survey years not included)

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AGEPRO VERSION 3.3

 PROJECTION RUN: gbyt 6+ no2008DFO survey Frebuild (75% prob SSB>SSBmsy in 2014)

 INPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\CGBYT\PDT_TRAC\C_GBYT_NEWEST08CAT_1500_MISSING_4.IN
 OUTPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\CGBYT\PDT_TRAC\C_GBYT_NEWEST08CAT_1500_MISSING_4.OUT
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:   10
 TOTAL NUMBER OF SIMULATIONS:   10000
 NUMBER OF FEASIBLE SIMULATIONS:   10000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:   1.00000000000000
 NUMBER OF BOOTSTRAP REALIZATIONS:   1000

 NUMBER OF RECRUITMENT MODELS:   1
 PROBABLE RECRUITMENT MODELS:   15
 RECRUITMENT MODELS BY YEAR
 YEAR    RECRUITMENT MODELS
   2009  15
   2010  15
   2011  15
   2012  15
   2013  15
   2014  15
   2015  15
   2016  15
   2017  15
   2018  15
   2019  15
   2020  15
   2021  15
   2022  15
   2023  15
   2024  15
   2025  15
   2026  15
   2027  15
   2028  15
   2029  15
   2030  15
   2031  15
   2032  15
   2033  15

 RECRUITMENT MODEL PROBABILITIES BY YEAR
 YEAR    MODEL PROBABILITY
   2009  1.00000000000000
   2010  1.00000000000000
   2011  1.00000000000000
   2012  1.00000000000000
   2013  1.00000000000000
   2014  1.00000000000000
   2015  1.00000000000000
   2016  1.00000000000000
   2017  1.00000000000000
   2018  1.00000000000000
   2019  1.00000000000000
   2020  1.00000000000000
   2021  1.00000000000000
   2022  1.00000000000000
   2023  1.00000000000000
   2024  1.00000000000000
   2025  1.00000000000000
   2026  1.00000000000000
   2027  1.00000000000000
   2028  1.00000000000000
   2029  1.00000000000000
   2030  1.00000000000000
   2031  1.00000000000000
   2032  1.00000000000000
   2033  1.00000000000000
```

RECRUITMENT MODEL SAMPLING FREQUENCIES BY YEAR

YEAR	MODEL SAMPLING FREQUENCIES
2009	10000
2010	10000
2011	10000
2012	10000
2013	10000
2014	10000
2015	10000
2016	10000
2017	10000
2018	10000
2019	10000
2020	10000
2021	10000
2022	10000
2023	10000
2024	10000
2025	10000
2026	10000
2027	10000
2028	10000
2029	10000
2030	10000
2031	10000
2032	10000
2033	10000

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2009		2.100
2010		1.500
2011	0.068	
2012	0.068	
2013	0.068	
2014	0.068	
2015	0.068	
2016	0.068	
2017	0.068	
2018	0.068	
2019	0.068	
2020	0.068	
2021	0.068	
2022	0.068	
2023	0.068	
2024	0.068	
2025	0.068	
2026	0.068	
2027	0.068	
2028	0.068	
2029	0.068	
2030	0.068	
2031	0.068	
2032	0.068	
2033	0.068	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2009	21.940	4.680
2010	24.297	5.350
2011	29.867	6.391
2012	35.952	8.893
2013	41.967	11.221
2014	48.888	13.412
2015	55.670	15.463
2016	60.886	16.552
2017	64.892	17.067
2018	67.951	17.337
2019	70.317	17.516
2020	72.104	17.599

2021	73.433	17.619
2022	74.490	17.629
2023	75.296	17.636
2024	75.906	17.570
2025	76.441	17.517
2026	76.859	17.580
2027	77.157	17.600
2028	77.365	17.629
2029	77.500	17.775
2030	77.648	17.869
2031	77.767	17.903
2032	77.804	17.935
2033	77.824	17.889

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	12.749	15.283	16.341	18.510	21.462	24.757	28.178	30.346	33.637
2010	13.444	16.620	18.000	20.400	23.732	27.621	31.489	33.943	37.792
2011	17.153	20.371	22.134	25.207	29.343	34.042	38.392	40.923	46.589
2012	20.341	23.707	25.658	29.308	34.600	41.453	48.643	52.568	59.795
2013	23.255	26.690	28.777	33.296	40.252	49.455	57.321	62.649	72.560
2014	26.309	30.214	32.654	38.435	47.316	57.346	67.255	73.243	85.026
2015	29.261	33.606	36.736	43.912	54.007	65.587	76.855	83.354	97.257
2016	31.843	36.794	40.443	48.505	59.229	71.416	83.431	90.792	105.038
2017	33.964	39.640	43.735	52.301	63.420	76.008	87.580	94.910	110.223
2018	35.958	42.048	46.441	55.091	66.436	79.195	91.366	98.069	113.296
2019	37.701	44.159	48.583	57.456	68.963	81.530	94.095	101.430	115.011
2020	38.732	45.756	50.319	59.376	70.655	83.528	95.513	103.640	117.631
2021	40.106	46.947	51.358	60.504	72.141	84.739	97.010	104.814	119.412
2022	40.951	47.883	52.512	61.685	73.261	85.804	97.895	105.653	120.487
2023	41.415	48.569	53.263	62.534	73.968	86.749	98.718	106.547	121.237
2024	42.394	49.097	53.825	63.102	74.683	87.468	99.598	107.094	120.723
2025	42.524	49.580	54.361	63.874	75.386	87.810	99.916	106.864	121.619
2026	42.893	49.745	54.527	64.223	75.752	88.225	100.127	107.622	121.603
2027	43.113	50.251	55.113	64.493	75.947	88.640	100.775	108.085	122.518
2028	42.835	50.581	55.370	64.498	76.087	88.738	100.760	108.548	121.455
2029	43.286	50.648	55.426	64.562	76.155	88.984	101.475	109.058	122.912
2030	43.854	50.832	55.457	64.745	76.082	89.083	101.622	109.571	124.219
2031	43.665	50.846	55.614	64.678	76.304	89.187	101.797	109.731	123.828
2032	43.612	50.666	55.428	64.631	76.475	89.315	101.793	109.715	124.383
2033	43.848	50.633	55.516	64.668	76.653	89.423	101.623	109.263	123.296

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 43.200 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	0.001
2010	0.001
2011	0.028
2012	0.205
2013	0.410
2014	0.614
2015	0.767
2016	0.853
2017	0.907
2018	0.938
2019	0.957
2020	0.969
2021	0.976
2022	0.982
2023	0.985
2024	0.988
2025	0.988
2026	0.989
2027	0.989
2028	0.989
2029	0.990
2030	0.992
2031	0.992
2032	0.991
2033	0.992

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2009	23.525	4.801
2010	29.195	5.934
2011	37.582	8.809
2012	43.731	10.921
2013	49.546	12.812
2014	56.307	14.741
2015	63.013	16.542
2016	68.176	17.473
2017	72.086	17.958
2018	75.083	18.222
2019	77.367	18.378
2020	79.106	18.440
2021	80.459	18.461
2022	81.498	18.492
2023	82.278	18.427
2024	82.916	18.366
2025	83.440	18.410
2026	83.827	18.450
2027	84.094	18.444
2028	84.283	18.550
2029	84.480	18.692
2030	84.623	18.754
2031	84.690	18.765
2032	84.702	18.747
2033	84.765	18.676

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	13.804	16.585	17.865	19.966	23.054	26.535	29.925	32.132	35.646
2010	17.304	20.346	21.997	24.853	28.746	33.050	37.121	39.506	44.455
2011	21.540	25.154	27.194	31.006	36.454	43.166	49.842	53.725	60.922
2012	24.750	28.607	30.804	35.382	42.241	50.852	58.642	63.689	73.241
2013	27.517	31.446	34.010	39.756	48.058	57.711	66.925	72.786	84.206
2014	30.856	35.156	38.278	45.214	54.841	65.729	76.589	82.485	95.766
2015	33.874	38.837	42.526	50.674	61.403	73.541	85.455	92.656	107.484
2016	36.356	42.186	46.508	55.274	66.636	79.450	91.566	98.914	114.121
2017	38.510	45.142	49.792	58.777	70.585	84.052	96.374	103.554	119.220
2018	40.440	47.660	52.525	61.770	73.765	86.825	99.562	107.290	122.394
2019	42.046	49.627	54.651	64.046	75.945	89.068	101.934	109.879	124.682
2020	43.702	51.248	56.027	65.738	77.854	90.858	103.562	111.958	127.096
2021	44.759	52.441	57.282	67.088	79.190	92.159	105.050	113.212	128.984
2022	45.520	53.447	58.272	68.270	80.311	93.240	106.223	114.065	130.170
2023	46.560	54.059	58.992	69.039	80.978	94.151	106.937	114.753	129.538
2024	47.148	54.568	59.692	69.682	81.799	94.929	107.350	115.217	129.781
2025	47.198	54.859	60.177	70.471	82.367	95.440	107.895	115.983	130.382
2026	47.195	55.361	60.482	70.592	82.634	95.760	108.644	116.231	131.261
2027	47.293	55.497	61.048	70.710	82.991	96.277	108.566	116.669	130.593
2028	47.638	56.013	61.150	70.803	82.865	96.359	109.263	116.996	131.289
2029	48.455	55.893	61.314	71.121	83.030	96.539	109.534	117.533	132.449
2030	48.706	56.275	61.409	71.073	83.287	96.554	109.672	118.120	132.966
2031	48.298	55.918	61.230	70.990	83.431	96.919	109.946	118.013	133.417
2032	48.199	55.933	61.330	70.917	83.409	96.962	109.487	117.960	132.744
2033	48.623	56.383	61.326	71.191	83.496	97.128	109.535	117.499	131.437

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000

2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2009	0.093	0.019
2010	0.054	0.011
2011	0.046	0.007
2012	0.045	0.006
2013	0.048	0.006
2014	0.050	0.006
2015	0.052	0.006
2016	0.053	0.005
2017	0.054	0.005
2018	0.054	0.005
2019	0.055	0.005
2020	0.055	0.005
2021	0.055	0.005
2022	0.056	0.005
2023	0.056	0.005
2024	0.056	0.005
2025	0.056	0.005
2026	0.056	0.005
2027	0.056	0.005
2028	0.056	0.005
2029	0.056	0.005
2030	0.056	0.005
2031	0.056	0.005
2032	0.056	0.005
2033	0.056	0.005

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	0.058	0.065	0.070	0.079	0.091	0.105	0.117	0.126	0.148
2010	0.034	0.038	0.040	0.045	0.052	0.060	0.068	0.074	0.087
2011	0.031	0.035	0.037	0.042	0.047	0.052	0.054	0.056	0.058
2012	0.032	0.035	0.037	0.041	0.046	0.050	0.053	0.055	0.057
2013	0.034	0.037	0.040	0.044	0.048	0.053	0.056	0.057	0.060
2014	0.036	0.040	0.042	0.046	0.051	0.055	0.058	0.059	0.061
2015	0.038	0.042	0.044	0.048	0.052	0.056	0.059	0.060	0.062
2016	0.039	0.043	0.045	0.049	0.054	0.057	0.060	0.061	0.063
2017	0.040	0.044	0.047	0.050	0.054	0.058	0.060	0.061	0.063
2018	0.042	0.045	0.047	0.051	0.055	0.058	0.061	0.062	0.063
2019	0.042	0.046	0.048	0.052	0.055	0.059	0.061	0.062	0.063
2020	0.042	0.046	0.049	0.052	0.056	0.059	0.061	0.062	0.063
2021	0.043	0.047	0.049	0.052	0.056	0.059	0.061	0.062	0.064
2022	0.044	0.047	0.049	0.052	0.056	0.059	0.061	0.062	0.064
2023	0.044	0.047	0.049	0.053	0.056	0.059	0.061	0.062	0.064
2024	0.044	0.047	0.049	0.053	0.056	0.059	0.061	0.062	0.064
2025	0.044	0.047	0.049	0.053	0.056	0.059	0.061	0.062	0.064
2026	0.044	0.047	0.050	0.053	0.056	0.059	0.061	0.062	0.064
2027	0.044	0.048	0.050	0.053	0.057	0.060	0.061	0.062	0.064
2028	0.044	0.048	0.050	0.053	0.057	0.060	0.062	0.062	0.064
2029	0.044	0.048	0.050	0.053	0.057	0.060	0.061	0.062	0.064
2030	0.044	0.048	0.050	0.053	0.057	0.060	0.061	0.062	0.064
2031	0.044	0.048	0.050	0.053	0.057	0.060	0.062	0.062	0.064

2032	0.044	0.048	0.050	0.053	0.057	0.060	0.062	0.062	0.064
2033	0.044	0.048	0.050	0.053	0.057	0.060	0.062	0.062	0.064

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2009	21.633	4.480
2010	22.806	5.058
2011	27.432	6.115
2012	33.731	8.604
2013	39.277	10.832
2014	46.164	12.925
2015	53.755	15.448
2016	59.553	16.895
2017	64.045	17.528
2018	67.450	17.856
2019	70.087	18.067
2020	72.135	18.181
2021	73.596	18.217
2022	74.761	18.211
2023	75.688	18.252
2024	76.337	18.230
2025	76.906	18.095
2026	77.408	18.167
2027	77.716	18.215
2028	78.004	18.166
2029	78.121	18.323
2030	78.266	18.462
2031	78.429	18.473
2032	78.479	18.545
2033	78.511	18.517

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	12.886	15.197	16.231	18.381	21.197	24.342	27.583	29.698	32.955
2010	12.635	15.581	16.740	19.150	22.335	25.951	29.616	31.885	35.632
2011	14.958	18.543	20.194	22.992	26.769	31.152	35.795	38.504	43.382
2012	18.821	22.007	23.936	27.269	32.318	39.007	46.105	49.799	56.727
2013	21.318	24.782	26.765	30.696	37.589	46.405	54.081	59.404	68.718
2014	24.738	28.315	30.599	36.059	44.673	54.283	63.886	69.864	80.830
2015	27.838	32.019	34.744	41.723	52.293	63.673	74.781	81.351	95.218
2016	30.312	35.293	38.795	46.886	57.688	70.354	82.639	90.278	104.700
2017	32.874	38.087	42.231	51.061	62.471	75.348	87.874	95.296	109.618

2018	34.793	40.913	45.212	54.243	65.706	79.281	91.203	98.865	114.360
2019	36.402	43.112	47.628	56.722	68.601	81.791	94.577	102.189	116.955
2020	38.000	45.007	49.664	58.880	70.717	83.686	96.503	104.699	119.314
2021	39.341	46.390	50.825	60.385	72.070	85.323	98.217	105.914	121.373
2022	40.352	47.283	52.012	61.413	73.417	86.296	99.011	106.988	122.375
2023	41.055	47.941	52.909	62.618	74.394	87.240	99.902	108.220	123.471
2024	41.846	48.495	53.491	62.924	74.932	88.328	100.725	108.837	122.925
2025	42.388	49.279	54.051	63.755	75.633	88.611	101.346	108.551	123.560
2026	42.595	49.559	54.225	64.505	76.209	89.411	101.716	109.244	123.991
2027	42.447	49.839	54.516	64.550	76.545	89.553	102.255	109.705	124.528
2028	42.725	50.226	55.136	64.777	76.709	89.746	102.459	110.378	124.523
2029	42.356	50.322	55.331	64.796	76.650	89.947	102.772	110.635	125.056
2030	43.280	50.357	55.358	64.830	76.754	90.058	103.011	111.284	125.731
2031	43.462	50.673	55.581	65.035	76.802	90.198	103.335	111.444	126.105
2032	43.421	50.533	55.440	64.957	76.983	90.369	103.472	111.942	126.040
2033	43.352	50.292	55.349	64.799	77.334	90.550	103.486	111.083	125.537

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2009	39153.612	28864.309
2010	39406.439	29383.242
2011	38854.954	28997.361
2012	38615.696	28832.183
2013	38692.652	28784.968
2014	39221.171	29078.611
2015	39018.137	28975.290
2016	39031.924	29112.955
2017	38983.557	28870.130
2018	38639.563	28698.265
2019	38946.714	28655.211
2020	39128.261	29137.288
2021	38881.959	28957.247
2022	39074.629	28864.612
2023	39295.610	29223.248
2024	38962.281	29175.134
2025	39131.472	28715.651
2026	38646.466	29045.789
2027	39116.714	29173.191
2028	39263.625	29212.280

2029	38984.861	28944.670
2030	38796.254	28800.127
2031	38787.155	28830.746
2032	39315.694	29292.675
2033	39389.528	29098.826

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	7830.590	10647.100	11703.324	20056.045	24677.255	54126.267	87946.452	100859.232	116856.389
2010	7959.884	10649.097	11742.933	20010.579	24654.714	54128.508	91098.334	100866.709	117308.426
2011	7735.965	10604.303	11591.468	19971.416	24621.780	53676.084	88562.605	100866.231	116837.748
2012	7473.212	10630.806	11691.047	19925.058	24626.253	53385.438	88062.377	100858.839	117873.614
2013	7808.663	10660.269	11707.544	19979.808	24653.067	53436.400	88428.787	100856.503	117620.019
2014	7719.024	10612.864	11651.138	20073.085	24672.138	54074.367	89239.193	100862.926	117286.622
2015	7491.798	10672.047	11794.497	20005.100	24674.444	53744.441	89039.070	100861.341	117869.587
2016	7689.520	10616.647	11546.885	19924.585	24651.156	53980.194	89867.767	100860.049	117216.966
2017	7710.344	10672.566	11693.919	20015.557	24673.160	53660.727	88551.776	100865.199	116943.943
2018	7788.736	10645.325	11676.130	19935.926	24642.527	53490.836	88571.356	100853.752	116364.405
2019	7882.938	10693.183	11739.024	20027.157	24635.950	53739.493	87582.672	100858.843	116702.060
2020	7757.626	10628.261	11573.563	19974.828	24662.809	54111.858	89311.452	100866.268	117075.670
2021	7660.594	10603.238	11685.673	19953.650	24628.695	53624.295	88210.729	100862.673	117898.841
2022	7678.389	10639.201	11620.854	20022.431	24675.036	53982.924	87689.795	100860.918	117722.675
2023	7829.245	10652.270	11717.812	20019.863	24676.459	54051.864	89545.501	100861.045	117217.965
2024	7687.815	10627.629	11627.403	19936.044	24636.777	53571.674	89647.169	100869.919	118351.679
2025	7785.150	10655.735	11825.482	20072.283	24682.446	53825.826	88166.740	100860.406	116636.844
2026	7563.671	10561.927	11408.989	19918.381	24603.545	53599.278	89291.823	100862.196	117261.943
2027	7584.265	10613.665	11635.444	19943.981	24646.117	53782.708	89709.896	100860.748	117686.223
2028	7962.839	10662.036	11855.152	20049.222	24654.967	54017.719	89332.963	100871.711	119312.700
2029	7816.114	10672.380	11631.343	20024.288	24649.416	53872.644	88587.951	100861.027	117126.512
2030	7667.963	10665.174	11717.976	19927.126	24632.236	53768.640	87637.064	100859.968	116181.528
2031	7839.599	10628.007	11720.185	20009.956	24622.538	53540.004	87892.827	100861.129	117714.962
2032	7602.983	10661.404	11662.412	20045.505	24680.711	53860.601	90552.083	100865.107	117555.055
2033	7883.042	10667.003	11725.321	20056.387	24680.765	54283.884	89551.008	100865.882	117284.581

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2009	2.100	0.000
2010	1.500	0.000
2011	1.720	0.378
2012	1.952	0.410
2013	2.354	0.608
2014	2.820	0.782
2015	3.274	0.933
2016	3.619	1.014
2017	3.883	1.055
2018	4.089	1.074
2019	4.247	1.085
2020	4.368	1.092
2021	4.458	1.094
2022	4.525	1.095
2023	4.579	1.094
2024	4.620	1.093
2025	4.654	1.090
2026	4.681	1.088
2027	4.703	1.091
2028	4.718	1.095
2029	4.728	1.100
2030	4.734	1.107
2031	4.742	1.111
2032	4.747	1.113
2033	4.750	1.113

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100
2010	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
2011	0.964	1.168	1.268	1.448	1.689	1.957	2.228	2.388	2.702
2012	1.158	1.356	1.461	1.653	1.916	2.216	2.502	2.677	3.032
2013	1.331	1.548	1.660	1.889	2.248	2.726	3.228	3.517	3.986
2014	1.554	1.771	1.904	2.210	2.701	3.338	3.902	4.262	4.983

2015	1.724	1.977	2.146	2.543	3.165	3.870	4.549	4.952	5.809
2016	1.894	2.170	2.377	2.854	3.510	4.268	5.006	5.451	6.333
2017	2.026	2.349	2.586	3.094	3.775	4.553	5.318	5.803	6.663
2018	2.146	2.505	2.766	3.290	3.993	4.791	5.540	5.986	6.926
2019	2.247	2.639	2.913	3.437	4.156	4.954	5.724	6.159	7.095
2020	2.335	2.746	3.022	3.564	4.273	5.060	5.846	6.313	7.196
2021	2.415	2.831	3.091	3.657	4.365	5.162	5.938	6.410	7.313
2022	2.477	2.885	3.154	3.717	4.445	5.219	5.991	6.491	7.411
2023	2.523	2.944	3.213	3.776	4.499	5.275	6.041	6.535	7.444
2024	2.574	2.971	3.252	3.824	4.534	5.341	6.081	6.562	7.420
2025	2.602	2.998	3.282	3.859	4.571	5.373	6.131	6.582	7.388
2026	2.590	3.026	3.311	3.896	4.608	5.393	6.138	6.588	7.482
2027	2.616	3.046	3.319	3.913	4.629	5.407	6.146	6.617	7.515
2028	2.616	3.068	3.355	3.911	4.644	5.421	6.196	6.671	7.495
2029	2.624	3.070	3.361	3.932	4.639	5.431	6.203	6.687	7.511
2030	2.674	3.062	3.369	3.927	4.639	5.452	6.230	6.723	7.620
2031	2.660	3.087	3.370	3.930	4.642	5.453	6.242	6.735	7.650
2032	2.666	3.075	3.373	3.932	4.658	5.456	6.244	6.742	7.659
2033	2.656	3.084	3.364	3.920	4.680	5.464	6.258	6.728	7.636

REALIZED F SERIES

YEAR	AVG F	STD
2009	0.116	0.026
2010	0.070	0.016
2011	0.068	0.000
2012	0.068	0.000
2013	0.068	0.000
2014	0.068	0.000
2015	0.068	0.000
2016	0.068	0.000
2017	0.068	0.000
2018	0.068	0.000
2019	0.068	0.000
2020	0.068	0.000
2021	0.068	0.000
2022	0.068	0.000
2023	0.068	0.000
2024	0.068	0.000
2025	0.068	0.000
2026	0.068	0.000
2027	0.068	0.000
2028	0.068	0.000
2029	0.068	0.000
2030	0.068	0.000
2031	0.068	0.000
2032	0.068	0.000
2033	0.068	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2009	0.069	0.080	0.085	0.096	0.113	0.132	0.150	0.161	0.193
2010	0.042	0.047	0.051	0.058	0.068	0.080	0.091	0.098	0.120
2011	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2012	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2013	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2014	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2015	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2016	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2017	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2018	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2019	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2020	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2021	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2022	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2023	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2024	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2025	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2026	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2027	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2028	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2029	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068

2030	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2031	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2032	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
2033	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.250

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2009	0.001
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000

SNE/MA Yellowtail Flounder

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 SNEMA_GARM2008_Agepro_Two_Stanzas_Rebuild

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\DSNEYT\D_SNEYT_NEWEST08CAT__FREB.IN



 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\DSNEYT\D_SNEYT_NEWEST08CAT__FREB.OUT



 RECRUITMENT MODEL:           15
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:           10
 TOTAL NUMBER OF SIMULATIONS:        10000
 NUMBER OF FEASIBLE SIMULATIONS:        10000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             0.504
 2009  0.070
 2010  0.075
 2011  0.075
 2012  0.075
 2013  0.075
 2014  0.075
 2015  0.191
 2016  0.191
 2017  0.191
 2018  0.191
 2019  0.191
 2020  0.191
 2021  0.191
 2022  0.191
 2023  0.191
 2024  0.191
 2025  0.191
 2026  0.191
 2027  0.191
 2028  0.191
 2029  0.191
 2030  0.191
 2031  0.191
 2032  0.191
 2033  0.191
 2034  0.191
 2035  0.191
 2036  0.191
 2037  0.191
 2038  0.191
 2039  0.191
 2040  0.191
 2041  0.191
 2042  0.191
 2043  0.191
 2044  0.191
 2045  0.191
 2046  0.191
 2047  0.191
 2048  0.191
 2049  0.191
 2050  0.191
 2051  0.191
 2052  0.191
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2053	0.191
2054	0.191
2055	0.191
2056	0.191
2057	0.191

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	5.171	1.196
2009	5.647	1.284
2010	8.162	3.332
2011	12.810	7.279
2012	18.123	10.149
2013	23.957	12.298
2014	29.584	13.780
2015	32.913	13.835
2016	33.621	12.867
2017	33.888	12.084
2018	34.059	11.597
2019	34.189	11.290
2020	34.312	11.163
2021	34.443	11.157
2022	34.525	11.168
2023	34.563	11.092
2024	34.561	10.963
2025	34.579	10.980
2026	34.623	11.051
2027	34.631	11.110
2028	34.614	11.194
2029	34.633	11.194
2030	34.626	11.228
2031	34.562	11.148
2032	34.498	11.050
2033	34.485	11.039
2034	34.553	11.029
2035	34.642	10.998
2036	34.686	11.010
2037	34.692	11.012
2038	34.667	11.045
2039	34.633	11.095
2040	34.608	11.130
2041	34.621	11.035
2042	34.636	10.991
2043	34.650	10.983
2044	34.604	11.020
2045	34.518	10.933
2046	34.552	10.911
2047	34.558	10.938
2048	34.508	10.867
2049	34.572	10.832
2050	34.659	10.928
2051	34.637	10.974
2052	34.611	10.973
2053	34.643	11.014
2054	34.696	11.042
2055	34.759	10.989
2056	34.795	11.040
2057	34.789	11.108

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	2.911	3.394	3.727	4.291	5.096	5.933	6.701	7.212	8.467
2009	3.200	3.714	4.077	4.715	5.547	6.434	7.330	7.830	9.023
2010	3.837	4.483	4.862	5.590	7.585	9.730	12.158	14.911	20.033
2011	4.134	4.826	5.297	7.244	11.262	16.114	22.125	27.902	37.668
2012	4.332	5.437	6.711	10.598	16.232	23.091	32.559	38.351	49.025
2013	4.671	7.249	9.980	15.173	21.794	30.621	41.387	47.020	59.978
2014	5.144	10.443	14.132	19.725	27.436	37.698	48.351	54.913	69.847
2015	6.595	13.494	17.218	22.941	30.919	41.257	51.673	58.205	72.004
2016	9.015	16.117	19.043	24.337	31.764	41.466	50.920	57.600	69.300
2017	11.182	17.648	20.206	25.186	31.991	41.191	50.274	55.966	67.983

2018	13.536	18.274	20.958	25.677	32.265	40.882	49.764	55.784	68.174
2019	14.966	18.968	21.240	25.921	32.448	40.834	49.622	55.284	66.093
2020	15.618	19.329	21.635	26.093	32.333	40.885	49.800	55.506	65.947
2021	16.248	19.665	21.817	26.273	32.485	40.958	49.738	55.600	66.774
2022	16.497	19.774	21.872	26.220	32.507	41.167	49.947	55.361	67.180
2023	16.648	19.850	22.009	26.313	32.601	41.060	49.746	55.511	66.295
2024	16.619	20.003	22.034	26.391	32.705	41.227	49.519	55.067	65.909
2025	16.628	20.045	21.997	26.348	32.691	41.161	49.726	55.215	66.189
2026	16.501	20.055	22.110	26.316	32.878	41.008	49.809	55.282	66.451
2027	16.685	19.961	22.083	26.417	32.823	41.080	49.939	55.636	66.969
2028	16.723	19.938	21.998	26.352	32.536	41.112	50.270	56.107	67.194
2029	16.556	19.834	22.073	26.296	32.559	41.189	50.417	55.635	66.831
2030	16.448	19.879	21.937	26.167	32.618	41.160	50.259	55.968	66.492
2031	16.473	19.826	21.931	26.155	32.581	41.206	50.052	55.460	65.501
2032	16.651	19.815	21.887	26.259	32.507	41.198	49.787	55.016	66.107
2033	16.646	19.831	22.059	26.289	32.381	41.191	50.017	55.051	66.542
2034	16.700	19.987	22.035	26.348	32.556	41.153	49.827	55.140	66.084
2035	16.745	19.919	22.111	26.398	32.714	41.389	49.790	55.243	65.681
2036	16.754	19.907	22.186	26.368	32.802	41.281	50.046	55.315	65.733
2037	16.780	20.088	22.158	26.387	32.723	41.231	49.749	55.547	66.440
2038	16.696	20.042	22.130	26.474	32.613	41.437	49.981	55.475	65.506
2039	16.517	19.926	22.107	26.382	32.597	41.346	50.239	55.530	66.304
2040	16.563	19.938	22.101	26.236	32.613	41.294	49.983	55.819	66.716
2041	16.673	20.014	22.130	26.301	32.782	41.269	49.939	55.130	66.789
2042	16.694	20.036	22.201	26.406	32.821	41.145	49.855	55.290	66.190
2043	16.773	20.130	22.331	26.413	32.606	41.257	50.038	55.404	65.918
2044	16.940	20.129	22.155	26.480	32.515	41.089	49.680	55.427	67.212
2045	16.966	20.136	22.236	26.384	32.565	41.023	49.362	54.902	66.615
2046	16.792	20.031	22.274	26.404	32.669	40.917	49.478	54.991	66.247
2047	16.669	20.096	22.219	26.397	32.563	41.083	49.534	54.837	66.207
2048	16.762	20.048	22.131	26.487	32.611	41.012	49.423	54.701	65.837
2049	16.709	20.116	22.088	26.591	32.777	41.008	49.395	54.640	65.999
2050	16.499	19.997	22.078	26.571	32.790	41.107	49.608	55.068	65.970
2051	16.674	19.884	22.205	26.595	32.687	41.035	49.758	55.300	66.590
2052	16.579	19.944	22.149	26.536	32.721	40.936	49.568	55.239	66.826
2053	16.694	19.881	22.071	26.543	32.724	41.307	49.603	55.023	66.805
2054	16.670	19.999	22.155	26.554	32.842	41.298	49.779	55.594	66.860
2055	16.816	20.137	22.221	26.565	32.951	41.320	50.097	55.399	66.373
2056	16.712	20.051	22.174	26.500	32.911	41.523	50.251	55.287	65.657
2057	16.545	19.999	22.043	26.404	32.914	41.478	50.078	55.786	67.216

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 27.400 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.053
2012	0.164
2013	0.322
2014	0.501
2015	0.612
2016	0.644
2017	0.670
2018	0.687
2019	0.692
2020	0.704
2021	0.702
2022	0.706
2023	0.707
2024	0.713
2025	0.711
2026	0.709
2027	0.710
2028	0.706
2029	0.706
2030	0.699
2031	0.702
2032	0.702
2033	0.703
2034	0.705
2035	0.708

2036	0.708
2037	0.714
2038	0.713
2039	0.707
2040	0.703
2041	0.709
2042	0.711
2043	0.712
2044	0.709
2045	0.709
2046	0.710
2047	0.710
2048	0.713
2049	0.719
2050	0.720
2051	0.716
2052	0.716
2053	0.714
2054	0.715
2055	0.716
2056	0.717
2057	0.713

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2008	5.644	1.218
2009	8.266	3.322
2010	13.126	7.007
2011	18.454	9.834
2012	24.089	11.997
2013	29.989	13.738
2014	35.647	14.958
2015	38.692	14.818
2016	39.353	13.895
2017	39.680	13.215
2018	39.861	12.751
2019	40.014	12.520
2020	40.156	12.452
2021	40.263	12.443
2022	40.323	12.351
2023	40.338	12.227
2024	40.370	12.228
2025	40.415	12.283
2026	40.428	12.340
2027	40.411	12.421
2028	40.431	12.444
2029	40.429	12.488
2030	40.369	12.418
2031	40.298	12.321
2032	40.281	12.299
2033	40.344	12.278
2034	40.423	12.237
2035	40.468	12.238
2036	40.483	12.245
2037	40.472	12.269
2038	40.450	12.326
2039	40.422	12.376
2040	40.429	12.295
2041	40.436	12.241
2042	40.451	12.216
2043	40.403	12.243
2044	40.325	12.174
2045	40.352	12.153
2046	40.351	12.173
2047	40.304	12.098
2048	40.351	12.043
2049	40.442	12.118
2050	40.434	12.170

2051	40.406	12.174
2052	40.441	12.223
2053	40.506	12.267
2054	40.566	12.211
2055	40.599	12.251
2056	40.605	12.326
2057	40.584	12.345

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3.327	3.816	4.149	4.749	5.550	6.389	7.234	7.714	8.856
2009	3.894	4.566	4.955	5.696	7.704	9.834	12.259	14.968	20.054
2010	4.488	5.279	5.748	7.687	11.744	16.325	22.131	27.561	36.630
2011	4.840	5.972	7.252	11.132	16.719	23.347	32.460	37.930	48.106
2012	5.123	7.662	10.391	15.520	22.040	30.663	41.000	46.402	59.152
2013	5.609	10.828	14.456	20.199	27.932	38.136	48.685	55.129	69.908
2014	7.287	14.478	18.507	24.907	33.530	44.672	55.871	62.492	78.466
2015	10.020	18.082	21.792	27.972	36.792	47.810	58.424	65.802	80.012
2016	12.647	20.288	23.532	29.298	37.389	47.861	57.992	64.617	77.427
2017	15.385	21.422	24.493	30.201	37.826	47.617	57.542	64.042	77.705
2018	17.156	22.289	25.096	30.570	38.126	47.337	57.158	63.350	75.668
2019	18.396	22.829	25.682	30.843	38.110	47.634	57.037	63.450	75.330
2020	19.338	23.353	25.893	30.986	38.121	47.517	57.178	63.336	75.646
2021	19.734	23.568	26.025	31.014	38.233	47.778	57.284	63.143	76.041
2022	20.088	23.680	26.144	31.096	38.267	47.680	57.303	63.383	75.157
2023	19.969	23.800	26.155	31.280	38.497	47.816	57.081	63.176	75.130
2024	19.906	23.809	26.163	31.212	38.377	47.828	56.982	63.186	75.199
2025	19.740	23.857	26.315	31.170	38.595	47.731	57.136	63.540	75.352
2026	20.083	23.895	26.281	31.238	38.606	47.760	57.287	63.438	76.115
2027	20.044	23.794	26.134	31.156	38.333	47.761	57.589	64.125	75.984
2028	19.954	23.762	26.189	31.158	38.246	47.852	57.983	63.769	75.856
2029	19.706	23.664	26.145	31.014	38.339	47.953	57.636	64.015	75.717
2030	19.775	23.651	26.148	30.981	38.388	47.929	57.532	63.803	74.687
2031	19.917	23.555	26.129	31.081	38.241	47.955	57.116	62.916	74.771
2032	19.963	23.709	26.164	31.114	38.160	48.002	57.506	62.853	75.318
2033	19.949	23.817	26.213	31.185	38.399	47.834	57.343	62.980	74.964
2034	20.096	23.794	26.409	31.213	38.454	47.952	57.190	63.015	74.774
2035	20.069	23.850	26.407	31.207	38.512	47.894	57.259	63.290	74.700
2036	20.071	24.033	26.401	31.240	38.453	47.998	57.179	63.485	75.200
2037	19.941	23.919	26.397	31.349	38.382	48.000	57.498	63.583	74.477
2038	19.769	23.818	26.314	31.238	38.385	47.978	57.652	63.596	75.185
2039	19.725	23.763	26.292	31.140	38.287	48.019	57.376	63.665	74.818
2040	20.036	23.867	26.235	31.148	38.569	47.949	57.327	63.176	75.628
2041	20.029	23.843	26.359	31.261	38.547	47.859	57.201	62.943	75.503
2042	20.140	24.024	26.522	31.325	38.460	47.853	57.079	63.336	75.368
2043	20.408	24.036	26.412	31.306	38.331	47.725	57.166	63.305	75.256
2044	20.364	24.083	26.428	31.209	38.352	47.727	56.844	63.122	75.057
2045	20.038	23.882	26.493	31.289	38.403	47.570	56.736	62.986	75.413
2046	19.930	24.003	26.448	31.274	38.497	47.669	56.897	63.037	76.015
2047	20.135	23.898	26.282	31.377	38.382	47.553	56.867	62.580	74.594
2048	20.047	23.896	26.321	31.458	38.482	47.600	56.745	62.478	75.168
2049	19.818	23.900	26.296	31.504	38.612	47.756	56.854	62.809	74.648
2050	19.814	23.738	26.444	31.531	38.542	47.663	57.136	63.066	75.554
2051	19.848	23.806	26.354	31.453	38.419	47.597	56.977	63.226	75.407
2052	19.930	23.768	26.327	31.482	38.453	47.954	56.918	62.973	75.705
2053	19.929	23.864	26.313	31.414	38.565	48.015	57.238	63.288	76.084
2054	20.005	24.015	26.452	31.521	38.623	47.961	57.586	63.034	75.041
2055	19.936	23.978	26.349	31.353	38.729	48.067	57.667	63.460	74.433
2056	20.016	23.836	26.172	31.308	38.616	48.219	57.612	63.690	75.809
2057	20.096	23.872	26.292	31.351	38.684	47.931	57.451	63.528	76.334

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	1.000
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000

2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000
2041	1.000
2042	1.000
2043	1.000
2044	1.000
2045	1.000
2046	1.000
2047	1.000
2048	1.000
2049	1.000
2050	1.000
2051	1.000
2052	1.000
2053	1.000
2054	1.000
2055	1.000
2056	1.000
2057	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2008	0.094	0.021
2009	0.048	0.010
2010	0.043	0.011
2011	0.043	0.009
2012	0.047	0.010
2013	0.051	0.009
2014	0.054	0.009
2015	0.142	0.021
2016	0.144	0.020
2017	0.145	0.019
2018	0.145	0.019
2019	0.145	0.018
2020	0.146	0.018
2021	0.146	0.018
2022	0.146	0.018
2023	0.146	0.018
2024	0.146	0.018
2025	0.146	0.018
2026	0.146	0.018
2027	0.146	0.018
2028	0.146	0.018
2029	0.146	0.018
2030	0.146	0.017

2031	0.146	0.018
2032	0.146	0.018
2033	0.146	0.018
2034	0.146	0.018
2035	0.146	0.018
2036	0.146	0.018
2037	0.146	0.018
2038	0.146	0.017
2039	0.146	0.017
2040	0.146	0.018
2041	0.146	0.018
2042	0.146	0.018
2043	0.146	0.017
2044	0.146	0.017
2045	0.146	0.018
2046	0.146	0.018
2047	0.146	0.018
2048	0.146	0.018
2049	0.146	0.018
2050	0.146	0.018
2051	0.146	0.018
2052	0.146	0.018
2053	0.146	0.018
2054	0.146	0.018
2055	0.146	0.018
2056	0.146	0.018
2057	0.146	0.018

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.057	0.065	0.070	0.079	0.091	0.106	0.121	0.132	0.150
2009	0.019	0.026	0.032	0.043	0.051	0.056	0.059	0.060	0.061
2010	0.021	0.026	0.029	0.035	0.043	0.052	0.059	0.062	0.066
2011	0.022	0.028	0.031	0.037	0.044	0.050	0.055	0.057	0.064
2012	0.024	0.030	0.034	0.041	0.048	0.054	0.059	0.062	0.066
2013	0.027	0.034	0.038	0.045	0.052	0.058	0.062	0.064	0.068
2014	0.030	0.038	0.042	0.049	0.055	0.061	0.064	0.066	0.069
2015	0.084	0.102	0.113	0.130	0.146	0.158	0.167	0.171	0.177
2016	0.086	0.106	0.116	0.133	0.147	0.159	0.167	0.171	0.177
2017	0.092	0.108	0.118	0.134	0.148	0.159	0.167	0.171	0.176
2018	0.095	0.110	0.119	0.134	0.148	0.159	0.166	0.170	0.176
2019	0.096	0.111	0.120	0.135	0.148	0.159	0.167	0.171	0.176
2020	0.098	0.111	0.120	0.135	0.148	0.159	0.166	0.171	0.176
2021	0.098	0.112	0.121	0.135	0.149	0.159	0.167	0.170	0.176
2022	0.099	0.112	0.120	0.135	0.149	0.159	0.167	0.170	0.176
2023	0.097	0.111	0.121	0.136	0.149	0.159	0.166	0.170	0.176
2024	0.098	0.113	0.121	0.135	0.149	0.159	0.167	0.170	0.176
2025	0.099	0.112	0.121	0.136	0.149	0.159	0.166	0.170	0.176
2026	0.098	0.111	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2027	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2028	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2029	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2030	0.099	0.113	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2031	0.099	0.113	0.121	0.136	0.149	0.159	0.167	0.171	0.177
2032	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2033	0.098	0.112	0.121	0.135	0.149	0.159	0.167	0.170	0.176
2034	0.097	0.112	0.121	0.135	0.148	0.159	0.166	0.170	0.176
2035	0.099	0.112	0.121	0.136	0.148	0.159	0.166	0.170	0.176
2036	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2037	0.098	0.112	0.121	0.136	0.149	0.160	0.167	0.171	0.176
2038	0.098	0.112	0.122	0.136	0.149	0.159	0.167	0.170	0.176
2039	0.099	0.113	0.121	0.136	0.149	0.159	0.166	0.170	0.176
2040	0.098	0.112	0.121	0.135	0.149	0.159	0.167	0.170	0.177
2041	0.098	0.112	0.120	0.135	0.149	0.159	0.167	0.171	0.176
2042	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.177
2043	0.099	0.112	0.122	0.136	0.149	0.159	0.167	0.171	0.176
2044	0.100	0.113	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2045	0.099	0.112	0.121	0.136	0.149	0.159	0.166	0.170	0.176
2046	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2047	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176

2048	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2049	0.098	0.112	0.120	0.135	0.149	0.159	0.167	0.171	0.176
2050	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2051	0.099	0.113	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2052	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2053	0.099	0.112	0.121	0.135	0.149	0.159	0.166	0.170	0.176
2054	0.097	0.111	0.120	0.135	0.149	0.159	0.166	0.170	0.176
2055	0.098	0.112	0.121	0.136	0.149	0.159	0.167	0.170	0.176
2056	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176
2057	0.099	0.112	0.121	0.136	0.149	0.159	0.167	0.171	0.176

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD:******

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	6.501	1.343
2009	9.321	3.694
2010	14.756	7.807
2011	20.772	11.040

2012	27.188	13.550
2013	33.921	15.569
2014	40.384	16.982
2015	45.740	17.596
2016	46.545	16.477
2017	46.935	15.642
2018	47.149	15.073
2019	47.330	14.785
2020	47.498	14.695
2021	47.629	14.682
2022	47.705	14.581
2023	47.725	14.441
2024	47.762	14.429
2025	47.812	14.485
2026	47.829	14.553
2027	47.812	14.652
2028	47.835	14.684
2029	47.832	14.735
2030	47.766	14.663
2031	47.684	14.551
2032	47.659	14.515
2033	47.725	14.489
2034	47.816	14.442
2035	47.874	14.441
2036	47.897	14.448
2037	47.887	14.473
2038	47.860	14.542
2039	47.826	14.602
2040	47.831	14.514
2041	47.839	14.447
2042	47.857	14.415
2043	47.805	14.444
2044	47.718	14.376
2045	47.741	14.345
2046	47.737	14.358
2047	47.688	14.279
2048	47.737	14.214
2049	47.839	14.288
2050	47.838	14.351
2051	47.809	14.367
2052	47.846	14.422
2053	47.917	14.470
2054	47.987	14.411
2055	48.030	14.453
2056	48.042	14.537
2057	48.019	14.566

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3.947	4.485	4.853	5.514	6.397	7.321	8.253	8.783	10.043
2009	4.416	5.175	5.616	6.457	8.703	11.090	13.765	16.743	22.357
2010	5.106	5.989	6.525	8.689	13.241	18.312	24.808	30.767	40.974
2011	5.496	6.765	8.198	12.539	18.839	26.285	36.437	42.662	54.016
2012	5.808	8.643	11.702	17.518	24.878	34.594	46.378	52.437	66.845
2013	6.361	12.192	16.327	22.828	31.570	43.111	55.054	62.460	79.178
2014	8.226	16.363	20.898	28.205	37.986	50.652	63.343	70.808	88.878
2015	11.678	21.183	25.629	32.999	43.535	56.509	69.359	77.830	94.597
2016	14.878	23.914	27.763	34.671	44.205	56.649	68.771	76.670	91.899
2017	17.849	25.319	28.965	35.729	44.825	56.329	68.048	75.630	91.850
2018	20.367	26.386	29.671	36.165	45.064	55.966	67.541	74.888	89.394
2019	21.761	27.031	30.389	36.493	45.119	56.250	67.390	74.957	89.008
2020	22.897	27.625	30.651	36.731	45.119	56.219	67.812	74.897	89.252
2021	23.332	27.882	30.775	36.719	45.246	56.522	67.618	74.727	89.920
2022	23.776	27.963	30.936	36.812	45.281	56.388	67.656	75.098	88.891
2023	23.678	28.184	30.970	37.015	45.513	56.548	67.451	74.534	89.042
2024	23.675	28.199	30.981	37.042	45.417	56.650	67.303	74.672	88.672
2025	23.463	28.278	31.227	36.857	45.662	56.467	67.590	75.040	88.797
2026	23.754	28.312	31.150	36.988	45.697	56.400	67.684	75.059	90.171
2027	23.766	28.172	30.947	36.881	45.397	56.473	67.979	75.777	89.754
2028	23.652	28.127	31.019	36.834	45.281	56.611	68.391	75.499	89.765
2029	23.387	28.028	30.967	36.705	45.403	56.740	68.201	75.658	89.380

2030	23.398	27.957	30.939	36.680	45.483	56.759	67.941	75.319	88.355
2031	23.542	27.911	30.950	36.751	45.294	56.787	67.562	74.325	88.499
2032	23.645	28.094	31.023	36.865	45.141	56.790	67.860	74.076	89.251
2033	23.663	28.171	31.046	36.933	45.433	56.577	67.885	74.324	88.533
2034	23.854	28.138	31.292	36.973	45.438	56.746	67.533	74.568	87.891
2035	23.719	28.267	31.267	36.971	45.619	56.676	67.704	74.853	88.192
2036	23.785	28.469	31.242	36.984	45.538	56.812	67.623	75.205	88.971
2037	23.651	28.372	31.252	37.121	45.410	56.776	67.826	75.113	88.326
2038	23.427	28.219	31.167	37.018	45.377	56.719	67.991	75.197	88.870
2039	23.415	28.150	31.107	36.877	45.371	56.812	67.787	75.199	88.355
2040	23.724	28.288	31.071	36.871	45.652	56.731	67.607	74.674	89.098
2041	23.707	28.256	31.215	37.035	45.599	56.625	67.671	74.229	89.548
2042	23.866	28.458	31.403	37.062	45.517	56.627	67.473	74.848	89.278
2043	24.020	28.503	31.286	37.036	45.350	56.400	67.698	74.920	88.734
2044	24.180	28.518	31.292	36.967	45.382	56.490	67.175	74.613	88.991
2045	23.761	28.359	31.409	37.015	45.426	56.286	67.208	74.511	89.073
2046	23.572	28.412	31.305	37.016	45.535	56.344	67.240	74.362	89.765
2047	23.865	28.293	31.128	37.118	45.430	56.297	67.231	74.065	88.086
2048	23.718	28.333	31.248	37.232	45.589	56.269	67.087	73.825	89.127
2049	23.484	28.301	31.140	37.322	45.700	56.445	67.156	74.163	88.395
2050	23.521	28.152	31.330	37.350	45.620	56.431	67.440	74.480	89.198
2051	23.593	28.175	31.215	37.256	45.514	56.273	67.428	74.501	88.938
2052	23.689	28.198	31.189	37.255	45.575	56.698	67.226	74.414	89.355
2053	23.582	28.292	31.147	37.194	45.654	56.784	67.725	74.924	90.007
2054	23.708	28.439	31.301	37.312	45.709	56.781	67.836	74.618	88.627
2055	23.760	28.388	31.234	37.114	45.850	56.961	68.220	74.731	87.921
2056	23.778	28.212	31.037	37.078	45.698	57.010	68.125	75.137	89.596
2057	23.776	28.264	31.113	37.132	45.811	56.764	67.866	75.149	90.229

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	1.000
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000
2041	1.000
2042	1.000
2043	1.000
2044	1.000
2045	1.000
2046	1.000
2047	1.000

2048	1.000
2049	1.000
2050	1.000
2051	1.000
2052	1.000
2053	1.000
2054	1.000
2055	1.000
2056	1.000
2057	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	21589.252	25463.883
2009	24813.932	26811.976
2010	27531.216	26526.195
2011	28455.439	26624.887
2012	29001.858	26184.110
2013	29692.499	26654.371
2014	29152.006	26001.615
2015	29468.770	26297.773
2016	29795.204	26511.317
2017	29579.231	26415.821
2018	30024.527	26452.584
2019	29780.841	26622.357
2020	29823.662	26751.375
2021	29610.649	26032.126
2022	29618.742	26378.748
2023	29937.921	26738.181
2024	29863.034	26525.095
2025	29643.788	26863.508
2026	29638.731	26468.586
2027	30006.513	27082.631
2028	29437.946	26105.084
2029	29501.117	26338.728
2030	29392.651	26317.418
2031	29920.209	26723.679
2032	30082.693	26457.820
2033	30006.753	26576.848
2034	29683.996	26447.743
2035	29772.196	26937.778
2036	29541.038	26264.657
2037	29792.071	26633.505
2038	29602.397	26208.410
2039	30063.799	27040.287
2040	29550.737	26367.241
2041	30060.699	26682.476
2042	28987.463	25286.346
2043	29756.592	26488.466
2044	30056.522	26923.941
2045	29389.217	26268.962
2046	29564.882	26449.118
2047	30315.123	27070.566
2048	29792.862	26725.215
2049	29431.096	26147.638
2050	29768.876	26309.960
2051	30004.565	26957.051
2052	30049.676	26702.010
2053	30066.449	27044.821
2054	29784.509	26733.668
2055	29809.289	26739.794
2056	29658.426	26385.788
2057	29973.129	26498.035

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%

2008	1148.822	1343.350	2281.067	4424.433	13006.005	30711.660	52248.170	78513.711	121787.565
2009	1159.183	1849.298	3201.688	6950.939	15900.038	31338.266	57933.641	87955.773	125379.153
2010	1274.218	3934.230	5462.414	10256.774	18595.817	31564.329	59128.903	92865.427	126490.040
2011	1865.317	4705.175	6851.794	11403.656	19086.094	32933.124	60183.021	93408.304	128563.006
2012	2852.944	5694.668	7738.004	12618.540	19438.337	33792.842	60320.623	92188.294	127265.588
2013	4256.221	5911.633	7920.016	13172.191	19610.503	34662.417	61406.374	95672.252	127195.764
2014	4315.338	6024.418	8173.033	13016.979	19573.608	32926.765	59869.877	92399.660	127307.749
2015	4417.524	6039.007	8188.998	13071.164	19602.479	34286.315	60891.961	93823.428	127702.836
2016	4513.921	6339.305	8217.859	13122.915	19738.476	34478.614	61190.210	96417.118	126802.055
2017	4556.116	6222.109	8246.455	13395.491	19652.722	33265.339	61672.598	94865.429	127014.074
2018	4512.434	6369.864	8263.012	13563.302	19882.912	35205.522	61201.242	95639.179	126929.157
2019	4522.516	6196.795	8143.810	13267.565	19790.730	34112.072	60763.699	97472.045	127181.917
2020	4595.131	6154.524	8221.556	13364.952	19711.362	34336.077	60724.918	97357.957	128009.333
2021	4489.187	6339.981	8252.347	13486.096	19805.823	34277.509	60408.533	93799.019	127329.965
2022	4509.902	6168.685	8241.147	13313.189	19673.468	34265.396	61070.234	93785.059	128184.354
2023	4528.948	6283.679	8259.410	13330.743	19830.188	34193.868	61425.897	97210.705	128425.605
2024	4582.259	6390.325	8379.507	13517.743	19686.139	34358.249	61035.340	95781.874	128285.735
2025	4496.561	6095.938	8139.183	13170.597	19518.334	33707.841	61614.880	97430.231	129115.355
2026	4460.631	6218.142	8227.304	13331.993	19667.756	33861.212	61011.980	95627.469	127974.535
2027	4605.651	6281.267	8220.489	13226.169	19693.674	34694.749	61575.923	99033.802	128727.812
2028	4530.216	6350.187	8272.127	13313.227	19614.114	34082.237	59915.179	93449.857	127516.149
2029	4502.842	6140.522	8097.788	12981.208	19628.401	34361.025	60538.032	95214.499	126847.500
2030	4499.893	6142.934	8230.721	13344.863	19607.879	33286.323	59656.536	95193.007	127852.915
2031	4495.226	6245.127	8245.003	13309.725	19795.330	34308.342	61395.946	95516.140	128362.976
2032	4590.447	6310.420	8285.873	13482.886	19901.432	35415.936	61602.355	94222.142	128071.644
2033	4525.202	6407.706	8364.918	13460.563	19824.164	35033.276	61372.267	95230.876	128140.838
2034	4598.071	6238.789	8217.533	13265.810	19671.284	33638.200	60868.812	95964.208	128247.923
2035	4568.883	6167.180	8113.074	13009.849	19587.572	34176.076	61430.313	98642.305	127799.519
2036	4484.131	6319.161	8400.765	13264.110	19725.704	33756.040	60135.342	94931.572	127940.755
2037	4547.388	6217.304	8227.077	13371.068	19764.515	34142.213	60907.692	97271.072	128627.522
2038	4482.051	6080.161	8218.113	13238.504	19769.670	34573.258	59911.933	95516.691	127605.852
2039	4478.493	6219.907	8212.643	13388.664	19686.216	35133.906	61501.171	98858.640	129057.208
2040	4540.636	6105.309	8102.798	13127.082	19642.858	34275.670	60719.484	94558.851	127419.993
2041	4542.947	6393.517	8335.846	13631.634	19914.840	34393.358	60590.736	97767.308	128487.526
2042	4497.827	6220.248	8265.179	13173.388	19683.823	33470.727	59038.252	88874.823	126053.906
2043	4546.153	6412.008	8366.065	13562.901	19752.268	33919.146	60227.553	97198.995	128386.451
2044	4548.534	6414.642	8430.933	13511.545	19612.963	35112.384	61367.229	97554.862	127825.324
2045	4462.097	6021.261	8149.408	13043.863	19525.989	33771.798	60363.200	94366.593	127762.073
2046	4487.319	6134.880	8093.528	13013.534	19709.678	34359.309	60014.756	96201.579	128672.487
2047	4614.258	6418.694	8261.361	13351.303	19824.035	35606.415	61939.120	98646.924	127596.290
2048	4504.186	6118.202	8126.533	12995.455	19752.298	34577.339	61467.937	96009.542	128296.837
2049	4557.367	6347.478	8269.314	13381.533	19684.557	33404.106	60643.571	95257.736	126666.098
2050	4513.984	6072.535	8114.498	13433.837	19694.778	35177.398	60656.817	94791.573	127276.624
2051	4512.983	6233.992	8205.319	13182.637	19730.641	34304.085	61522.915	96947.607	128946.541
2052	4593.667	6291.366	8353.689	13775.634	19823.273	35159.862	60690.716	97145.899	128886.848
2053	4524.276	6238.370	8172.334	13344.330	19723.590	34756.090	61625.621	98128.031	129094.193
2054	4450.000	6150.561	8261.361	12959.656	19700.793	34466.663	61143.038	97030.843	127268.212
2055	4553.800	6232.013	8276.309	13375.442	19535.362	34448.928	60993.576	96960.896	128496.136
2056	4469.029	6398.212	8250.633	13446.665	19728.512	34005.143	60493.385	95899.525	127074.695
2057	4521.911	6214.350	8239.483	13471.743	19838.581	34998.446	61337.436	96242.938	127668.804

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	0.504	0.000
2009	0.372	0.088
2010	0.508	0.161
2011	0.764	0.395
2012	1.131	0.641
2013	1.546	0.822
2014	1.954	0.943
2015	5.568	2.417
2016	5.707	2.239
2017	5.759	2.089
2018	5.785	1.991
2019	5.808	1.932
2020	5.829	1.903
2021	5.851	1.898
2022	5.868	1.901
2023	5.877	1.895
2024	5.879	1.875
2025	5.879	1.866

2026	5.885	1.876
2027	5.889	1.889
2028	5.888	1.903
2029	5.888	1.908
2030	5.889	1.911
2031	5.882	1.906
2032	5.870	1.888
2033	5.864	1.878
2034	5.870	1.878
2035	5.886	1.875
2036	5.897	1.874
2037	5.901	1.874
2038	5.897	1.878
2039	5.891	1.888
2040	5.886	1.894
2041	5.886	1.885
2042	5.889	1.873
2043	5.892	1.870
2044	5.888	1.876
2045	5.875	1.871
2046	5.871	1.857
2047	5.876	1.858
2048	5.871	1.856
2049	5.875	1.846
2050	5.888	1.853
2051	5.893	1.867
2052	5.888	1.872
2053	5.889	1.874
2054	5.896	1.878
2055	5.907	1.875
2056	5.916	1.877
2057	5.918	1.888

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.504	0.504	0.504	0.504	0.504	0.504	0.504	0.504	0.504
2009	0.209	0.242	0.265	0.308	0.366	0.427	0.485	0.521	0.607
2010	0.259	0.304	0.331	0.380	0.493	0.598	0.706	0.809	1.014
2011	0.284	0.332	0.361	0.463	0.687	0.944	1.251	1.579	2.162
2012	0.298	0.364	0.430	0.650	1.003	1.435	2.037	2.437	3.112
2013	0.318	0.462	0.611	0.956	1.395	1.974	2.710	3.118	3.983
2014	0.346	0.654	0.888	1.278	1.801	2.496	3.248	3.703	4.737
2015	1.046	2.191	2.854	3.836	5.204	7.000	8.861	9.981	12.554
2016	1.402	2.642	3.182	4.090	5.383	7.049	8.766	9.825	11.893
2017	1.809	2.946	3.424	4.242	5.435	7.030	8.599	9.588	11.660
2018	2.211	3.099	3.550	4.358	5.453	6.956	8.507	9.488	11.564
2019	2.525	3.217	3.603	4.397	5.505	6.942	8.419	9.434	11.313
2020	2.637	3.277	3.665	4.428	5.494	6.964	8.492	9.440	11.150
2021	2.758	3.336	3.708	4.459	5.507	6.954	8.484	9.436	11.276
2022	2.800	3.368	3.724	4.458	5.522	6.998	8.489	9.399	11.344
2023	2.835	3.384	3.746	4.465	5.513	7.006	8.484	9.485	11.334
2024	2.838	3.402	3.748	4.487	5.548	7.005	8.464	9.400	11.310
2025	2.851	3.395	3.748	4.486	5.550	7.028	8.447	9.388	11.264
2026	2.802	3.400	3.769	4.479	5.574	6.984	8.469	9.434	11.253
2027	2.832	3.404	3.772	4.483	5.572	6.981	8.497	9.490	11.382
2028	2.873	3.389	3.740	4.481	5.540	6.984	8.520	9.544	11.449
2029	2.851	3.389	3.743	4.464	5.517	6.989	8.568	9.535	11.416
2030	2.813	3.375	3.740	4.452	5.536	7.024	8.561	9.532	11.335
2031	2.810	3.373	3.744	4.456	5.526	7.026	8.518	9.451	11.308
2032	2.831	3.368	3.730	4.453	5.533	7.039	8.486	9.406	11.192
2033	2.844	3.379	3.755	4.464	5.508	6.994	8.495	9.348	11.296
2034	2.852	3.395	3.751	4.478	5.531	6.987	8.465	9.420	11.229
2035	2.885	3.392	3.766	4.481	5.537	7.023	8.465	9.417	11.248
2036	2.848	3.414	3.779	4.485	5.561	7.027	8.507	9.416	11.248
2037	2.869	3.417	3.778	4.485	5.567	7.030	8.477	9.448	11.298
2038	2.838	3.419	3.774	4.506	5.543	7.021	8.512	9.458	11.224
2039	2.808	3.388	3.771	4.489	5.528	7.029	8.543	9.431	11.240
2040	2.802	3.394	3.764	4.467	5.540	7.039	8.517	9.465	11.215
2041	2.821	3.411	3.746	4.467	5.549	7.012	8.479	9.409	11.321
2042	2.853	3.406	3.772	4.497	5.564	7.028	8.465	9.369	11.369
2043	2.852	3.431	3.803	4.499	5.555	6.995	8.489	9.456	11.303

2044	2.871	3.440	3.783	4.506	5.526	6.985	8.494	9.436	11.335
2045	2.893	3.442	3.772	4.482	5.529	6.972	8.422	9.365	11.335
2046	2.864	3.415	3.802	4.500	5.536	6.948	8.405	9.387	11.329
2047	2.841	3.429	3.796	4.487	5.542	6.980	8.427	9.319	11.448
2048	2.867	3.422	3.768	4.499	5.528	6.987	8.435	9.326	11.211
2049	2.850	3.431	3.767	4.513	5.558	6.952	8.405	9.277	11.265
2050	2.828	3.410	3.758	4.512	5.582	6.997	8.387	9.345	11.214
2051	2.842	3.406	3.781	4.516	5.551	6.992	8.440	9.414	11.323
2052	2.825	3.400	3.777	4.504	5.550	6.986	8.446	9.429	11.358
2053	2.855	3.398	3.763	4.512	5.541	7.013	8.423	9.389	11.428
2054	2.838	3.413	3.758	4.508	5.573	7.014	8.475	9.414	11.411
2055	2.847	3.427	3.781	4.518	5.579	7.036	8.510	9.407	11.355
2056	2.864	3.411	3.792	4.511	5.600	7.053	8.553	9.433	11.279
2057	2.831	3.410	3.761	4.510	5.584	7.043	8.539	9.524	11.323

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	3122.	3214.	3271.	3356.	3443.	3552.	3644.	3697.	3800.
2	237.	368.	453.	636.	915.	1394.	1879.	2269.	3472.
3	2716.	3413.	3826.	4767.	6085.	7923.	9701.	10700.	13245.
4	2394.	3178.	3562.	4205.	5180.	6296.	7454.	7991.	9241.
5	77.	114.	138.	183.	235.	299.	360.	400.	491.
6+	34.	50.	60.	80.	103.	130.	157.	175.	215.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	4469.	6398.	8251.	13447.	19729.	34005.	60493.	95900.	127075.
2	3724.	5096.	6768.	10938.	15975.	28171.	49878.	79291.	105079.
3	2832.	3915.	5258.	8249.	12539.	21937.	38916.	61758.	81004.
4	2046.	2822.	3696.	6036.	8921.	15721.	27874.	44385.	58392.
5	1405.	1925.	2556.	4215.	6065.	10757.	18568.	29721.	39432.
6+	8204.	10004.	11090.	13665.	17395.	22565.	29702.	34517.	42067.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.119	0.029
2009	0.070	0.000
2010	0.075	0.000
2011	0.075	0.000
2012	0.075	0.000
2013	0.075	0.000
2014	0.075	0.000
2015	0.191	0.000
2016	0.191	0.000
2017	0.191	0.000
2018	0.191	0.000
2019	0.191	0.000
2020	0.191	0.000
2021	0.191	0.000
2022	0.191	0.000
2023	0.191	0.000
2024	0.191	0.000
2025	0.191	0.000
2026	0.191	0.000
2027	0.191	0.000
2028	0.191	0.000
2029	0.191	0.000
2030	0.191	0.000
2031	0.191	0.000
2032	0.191	0.000
2033	0.191	0.000
2034	0.191	0.000
2035	0.191	0.000
2036	0.191	0.000
2037	0.191	0.000
2038	0.191	0.000
2039	0.191	0.000
2040	0.191	0.000
2041	0.191	0.000
2042	0.191	0.000
2043	0.191	0.000

2044	0.191	0.000
2045	0.191	0.000
2046	0.191	0.000
2047	0.191	0.000
2048	0.191	0.000
2049	0.191	0.000
2050	0.191	0.000
2051	0.191	0.000
2052	0.191	0.000
2053	0.191	0.000
2054	0.191	0.000
2055	0.191	0.000
2056	0.191	0.000
2057	0.191	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.068	0.081	0.087	0.099	0.115	0.135	0.156	0.174	0.200
2009	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2010	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
2011	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
2012	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
2013	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
2014	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
2015	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2016	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2017	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2018	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2019	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2020	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2021	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2022	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2023	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2024	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2025	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2026	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2027	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2028	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2029	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2030	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2031	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2032	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2033	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2034	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2035	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2036	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2037	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2038	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2039	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2040	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2041	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2042	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2043	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2044	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2045	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2046	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2047	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2048	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2049	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2050	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2051	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2052	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2053	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2054	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2055	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2056	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2057	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.254

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.002

2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

Cape Cod / Gulf of Maine Yellowtail Flounder

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 ccgom 6+

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\ECCYT\E_CCYT_NEWEST08CATCH_75%FMSY.IN



 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\ECCYT\E_CCYT_NEWEST08CATCH_75%FMSY.OUT



 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:           10
 TOTAL NUMBER OF SIMULATIONS:        10000
 NUMBER OF FEASIBLE SIMULATIONS:        10000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             0.727
 2009  0.149
 2010  0.179
 2011  0.179
 2012  0.179
 2013  0.179
 2014  0.179
 2015  0.179
 2016  0.179
 2017  0.179
 2018  0.179
 2019  0.179
 2020  0.179
 2021  0.179
 2022  0.179
 2023  0.179
 2024  0.179
 2025  0.179
 2026  0.179
 2027  0.179
 2028  0.179
 2029  0.179
 2030  0.179
 2031  0.179
 2032  0.179
 2033  0.179
 2034  0.179
 2035  0.179
 2036  0.179
 2037  0.179
 2038  0.179
 2039  0.179
 2040  0.179
 2041  0.179
 2042  0.179
 2043  0.179
 2044  0.179
 2045  0.179
 2046  0.179
 2047  0.179
 2048  0.179
 2049  0.179
 2050  0.179
 2051  0.179
 2052  0.179
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2053	0.179
2054	0.179
2055	0.179
2056	0.179
2057	0.179

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	3.438	0.657
2009	4.219	0.810
2010	5.422	0.819
2011	6.501	1.028
2012	7.245	1.210
2013	7.942	1.368
2014	8.459	1.497
2015	8.812	1.548
2016	9.052	1.566
2017	9.207	1.568
2018	9.317	1.573
2019	9.399	1.577
2020	9.452	1.576
2021	9.498	1.586
2022	9.531	1.594
2023	9.552	1.597
2024	9.562	1.578
2025	9.565	1.570
2026	9.574	1.576
2027	9.579	1.580
2028	9.577	1.595
2029	9.578	1.601
2030	9.583	1.605
2031	9.576	1.603
2032	9.569	1.592
2033	9.564	1.586
2034	9.567	1.586
2035	9.576	1.576
2036	9.585	1.578
2037	9.587	1.575
2038	9.588	1.583
2039	9.585	1.587
2040	9.584	1.599
2041	9.583	1.592
2042	9.587	1.584
2043	9.585	1.578
2044	9.589	1.583
2045	9.572	1.574
2046	9.573	1.571
2047	9.579	1.574
2048	9.569	1.569
2049	9.571	1.561
2050	9.586	1.570
2051	9.586	1.579
2052	9.581	1.581
2053	9.582	1.586
2054	9.587	1.591
2055	9.596	1.584
2056	9.604	1.582
2057	9.607	1.594

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	2.160	2.500	2.650	2.972	3.366	3.857	4.299	4.566	5.300
2009	2.742	3.053	3.244	3.643	4.115	4.726	5.331	5.627	6.427
2010	3.915	4.232	4.438	4.830	5.326	5.929	6.537	6.919	7.654
2011	4.727	5.106	5.339	5.773	6.353	7.049	7.866	8.436	9.729
2012	5.243	5.709	5.934	6.392	7.031	7.830	8.925	9.694	10.806
2013	5.718	6.204	6.451	6.969	7.666	8.627	9.924	10.609	11.975
2014	6.018	6.538	6.831	7.371	8.162	9.295	10.556	11.266	13.045
2015	6.254	6.813	7.085	7.675	8.524	9.676	10.956	11.752	13.475
2016	6.409	6.994	7.294	7.918	8.771	9.966	11.260	11.991	13.539
2017	6.528	7.117	7.443	8.076	8.930	10.103	11.385	12.161	13.754

2018	6.616	7.224	7.543	8.208	9.041	10.205	11.543	12.293	13.955
2019	6.697	7.263	7.616	8.272	9.132	10.298	11.574	12.357	14.039
2020	6.764	7.316	7.676	8.308	9.181	10.368	11.642	12.417	13.948
2021	6.822	7.366	7.701	8.356	9.220	10.418	11.711	12.439	14.061
2022	6.846	7.406	7.734	8.372	9.246	10.446	11.742	12.501	14.207
2023	6.869	7.409	7.758	8.402	9.262	10.474	11.752	12.563	14.247
2024	6.890	7.422	7.769	8.435	9.297	10.485	11.724	12.503	14.108
2025	6.901	7.444	7.772	8.437	9.295	10.487	11.702	12.497	14.176
2026	6.838	7.454	7.790	8.426	9.322	10.494	11.754	12.526	14.074
2027	6.885	7.465	7.811	8.429	9.313	10.468	11.769	12.556	14.228
2028	6.890	7.446	7.778	8.431	9.302	10.483	11.791	12.586	14.172
2029	6.855	7.454	7.778	8.414	9.291	10.487	11.810	12.645	14.138
2030	6.853	7.433	7.770	8.420	9.301	10.520	11.845	12.611	14.125
2031	6.827	7.408	7.761	8.414	9.303	10.511	11.796	12.597	14.042
2032	6.853	7.424	7.757	8.411	9.290	10.516	11.767	12.528	14.130
2033	6.874	7.437	7.769	8.411	9.281	10.500	11.774	12.505	14.142
2034	6.851	7.434	7.784	8.428	9.281	10.485	11.783	12.543	14.102
2035	6.870	7.446	7.794	8.437	9.289	10.508	11.761	12.541	14.119
2036	6.887	7.449	7.796	8.443	9.317	10.517	11.782	12.539	14.062
2037	6.889	7.464	7.800	8.445	9.308	10.492	11.773	12.558	14.150
2038	6.869	7.466	7.795	8.441	9.313	10.518	11.795	12.561	14.133
2039	6.864	7.448	7.793	8.443	9.303	10.528	11.804	12.563	14.086
2040	6.831	7.446	7.788	8.417	9.306	10.519	11.801	12.626	14.184
2041	6.818	7.446	7.785	8.423	9.306	10.505	11.783	12.585	14.180
2042	6.856	7.443	7.805	8.446	9.311	10.521	11.763	12.531	14.189
2043	6.822	7.482	7.825	8.447	9.316	10.511	11.781	12.563	14.165
2044	6.888	7.480	7.809	8.456	9.301	10.504	11.797	12.528	14.226
2045	6.923	7.472	7.789	8.442	9.288	10.499	11.756	12.522	14.144
2046	6.925	7.445	7.806	8.454	9.287	10.467	11.737	12.512	14.209
2047	6.882	7.440	7.808	8.444	9.315	10.469	11.758	12.514	14.254
2048	6.864	7.465	7.807	8.444	9.305	10.470	11.710	12.487	14.109
2049	6.875	7.458	7.798	8.446	9.316	10.447	11.727	12.487	14.141
2050	6.849	7.448	7.794	8.467	9.327	10.488	11.727	12.503	14.140
2051	6.860	7.447	7.803	8.446	9.326	10.498	11.759	12.542	14.184
2052	6.842	7.448	7.801	8.458	9.303	10.476	11.752	12.546	14.262
2053	6.863	7.436	7.782	8.461	9.304	10.515	11.721	12.561	14.290
2054	6.829	7.447	7.789	8.442	9.302	10.514	11.754	12.561	14.190
2055	6.858	7.464	7.806	8.464	9.327	10.506	11.789	12.519	14.259
2056	6.882	7.446	7.798	8.454	9.344	10.547	11.820	12.541	14.135
2057	6.856	7.447	7.787	8.446	9.333	10.525	11.850	12.564	14.191

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 7.790 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.006
2011	0.108
2012	0.259
2013	0.457
2014	0.615
2015	0.717
2016	0.784
2017	0.823
2018	0.850
2019	0.866
2020	0.880
2021	0.885
2022	0.891
2023	0.893
2024	0.896
2025	0.896
2026	0.900
2027	0.904
2028	0.898
2029	0.898
2030	0.896
2031	0.895
2032	0.894
2033	0.896
2034	0.899
2035	0.901

2036	0.901
2037	0.902
2038	0.901
2039	0.901
2040	0.900
2041	0.899
2042	0.903
2043	0.905
2044	0.904
2045	0.900
2046	0.903
2047	0.903
2048	0.903
2049	0.902
2050	0.900
2051	0.903
2052	0.901
2053	0.898
2054	0.900
2055	0.903
2056	0.902
2057	0.899

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2008	4.883	0.839
2009	6.112	0.898
2010	7.567	1.169
2011	8.689	1.407
2012	9.403	1.540
2013	10.075	1.656
2014	10.580	1.753
2015	10.927	1.797
2016	11.151	1.807
2017	11.308	1.815
2018	11.422	1.819
2019	11.501	1.822
2020	11.560	1.831
2021	11.604	1.841
2022	11.633	1.838
2023	11.646	1.818
2024	11.657	1.813
2025	11.669	1.821
2026	11.675	1.826
2027	11.672	1.837
2028	11.674	1.843
2029	11.680	1.852
2030	11.673	1.848
2031	11.663	1.837
2032	11.659	1.831
2033	11.665	1.831
2034	11.674	1.820
2035	11.680	1.820
2036	11.682	1.819
2037	11.684	1.826
2038	11.683	1.831
2039	11.683	1.843
2040	11.682	1.836
2041	11.685	1.830
2042	11.684	1.822
2043	11.684	1.825
2044	11.669	1.814
2045	11.671	1.814
2046	11.675	1.821
2047	11.667	1.813
2048	11.666	1.799
2049	11.683	1.810
2050	11.684	1.821

2051	11.676	1.818
2052	11.678	1.824
2053	11.689	1.834
2054	11.698	1.825
2055	11.703	1.824
2056	11.705	1.836
2057	11.705	1.841

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3.348	3.693	3.885	4.277	4.777	5.400	6.043	6.348	7.167
2009	4.467	4.815	5.028	5.454	6.014	6.673	7.338	7.744	8.491
2010	5.520	5.974	6.236	6.740	7.404	8.203	9.115	9.747	11.200
2011	6.316	6.841	7.134	7.686	8.459	9.398	10.630	11.441	12.882
2012	6.836	7.400	7.703	8.311	9.121	10.206	11.581	12.335	14.066
2013	7.318	7.927	8.243	8.871	9.765	11.019	12.400	13.188	15.085
2014	7.662	8.277	8.609	9.295	10.266	11.580	12.959	13.879	15.819
2015	7.858	8.526	8.885	9.615	10.629	11.994	13.438	14.289	16.016
2016	8.060	8.705	9.096	9.839	10.859	12.208	13.636	14.551	16.345
2017	8.147	8.854	9.239	10.021	11.009	12.358	13.835	14.717	16.563
2018	8.248	8.937	9.342	10.110	11.136	12.473	13.905	14.780	16.701
2019	8.350	9.003	9.426	10.176	11.205	12.592	13.998	14.875	16.639
2020	8.409	9.043	9.471	10.245	11.265	12.647	14.084	14.986	16.875
2021	8.445	9.103	9.502	10.255	11.292	12.690	14.141	15.028	16.943
2022	8.487	9.121	9.535	10.299	11.338	12.710	14.148	15.052	16.904
2023	8.488	9.129	9.551	10.342	11.351	12.748	14.111	15.014	16.836
2024	8.488	9.165	9.556	10.362	11.374	12.742	14.100	15.037	16.793
2025	8.473	9.174	9.603	10.353	11.393	12.745	14.136	15.061	16.781
2026	8.482	9.192	9.594	10.338	11.398	12.751	14.167	15.075	16.933
2027	8.508	9.190	9.567	10.337	11.378	12.754	14.183	15.114	16.889
2028	8.473	9.170	9.574	10.327	11.360	12.762	14.227	15.177	16.932
2029	8.458	9.147	9.567	10.325	11.376	12.770	14.249	15.141	16.917
2030	8.419	9.136	9.554	10.326	11.393	12.776	14.224	15.126	16.719
2031	8.459	9.137	9.549	10.323	11.361	12.780	14.167	15.060	16.826
2032	8.496	9.170	9.556	10.325	11.348	12.773	14.196	14.991	16.872
2033	8.464	9.157	9.574	10.344	11.369	12.759	14.204	15.087	16.859
2034	8.491	9.165	9.590	10.344	11.375	12.773	14.164	15.046	16.919
2035	8.528	9.189	9.582	10.361	11.408	12.793	14.183	15.059	16.758
2036	8.522	9.194	9.592	10.356	11.393	12.773	14.178	15.086	16.834
2037	8.488	9.197	9.585	10.359	11.388	12.798	14.193	15.121	16.855
2038	8.463	9.185	9.589	10.365	11.386	12.787	14.204	15.092	16.781
2039	8.455	9.181	9.585	10.347	11.384	12.788	14.224	15.163	16.870
2040	8.449	9.193	9.584	10.342	11.403	12.776	14.217	15.128	16.914
2041	8.483	9.177	9.591	10.362	11.400	12.824	14.197	15.036	16.884
2042	8.446	9.202	9.620	10.364	11.400	12.782	14.142	15.032	16.896
2043	8.497	9.209	9.606	10.371	11.370	12.778	14.185	15.085	16.858
2044	8.560	9.216	9.602	10.360	11.369	12.733	14.123	15.036	16.881
2045	8.530	9.196	9.607	10.372	11.366	12.734	14.133	15.038	16.990
2046	8.484	9.188	9.608	10.365	11.384	12.726	14.157	15.054	17.112
2047	8.506	9.186	9.611	10.365	11.383	12.715	14.130	15.026	16.841
2048	8.528	9.200	9.590	10.364	11.394	12.719	14.085	14.986	16.852
2049	8.462	9.171	9.582	10.399	11.412	12.740	14.131	14.988	16.832
2050	8.476	9.180	9.598	10.366	11.401	12.756	14.150	15.054	16.984
2051	8.475	9.163	9.607	10.391	11.394	12.728	14.176	15.050	16.976
2052	8.457	9.157	9.583	10.384	11.385	12.770	14.144	15.059	16.959
2053	8.448	9.169	9.597	10.368	11.380	12.798	14.200	15.062	16.954
2054	8.513	9.200	9.595	10.381	11.411	12.774	14.196	15.034	16.950
2055	8.471	9.183	9.588	10.373	11.439	12.811	14.259	15.044	16.749
2056	8.474	9.168	9.580	10.370	11.421	12.814	14.261	15.102	16.876
2057	8.492	9.176	9.593	10.354	11.439	12.803	14.231	15.084	17.044

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	1.000
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000

2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000
2041	1.000
2042	1.000
2043	1.000
2044	1.000
2045	1.000
2046	1.000
2047	1.000
2048	1.000
2049	1.000
2050	1.000
2051	1.000
2052	1.000
2053	1.000
2054	1.000
2055	1.000
2056	1.000
2057	1.000

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	AVG F_WT_B	STD
2008	0.153	0.026
2009	0.095	0.007
2010	0.117	0.011
2011	0.123	0.010
2012	0.127	0.010
2013	0.131	0.010
2014	0.133	0.010
2015	0.134	0.010
2016	0.135	0.009
2017	0.136	0.009
2018	0.136	0.009
2019	0.137	0.009
2020	0.137	0.009
2021	0.137	0.009
2022	0.137	0.009
2023	0.137	0.009
2024	0.137	0.009
2025	0.137	0.009
2026	0.137	0.009
2027	0.137	0.009
2028	0.137	0.009
2029	0.137	0.009
2030	0.137	0.009

2031	0.137	0.009
2032	0.137	0.009
2033	0.137	0.009
2034	0.137	0.009
2035	0.137	0.009
2036	0.137	0.009
2037	0.137	0.009
2038	0.137	0.009
2039	0.137	0.009
2040	0.137	0.009
2041	0.137	0.009
2042	0.137	0.009
2043	0.137	0.009
2044	0.137	0.009
2045	0.137	0.009
2046	0.137	0.009
2047	0.137	0.009
2048	0.137	0.009
2049	0.137	0.009
2050	0.137	0.009
2051	0.137	0.009
2052	0.137	0.009
2053	0.137	0.009
2054	0.137	0.009
2055	0.137	0.009
2056	0.137	0.009
2057	0.137	0.009

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.101	0.114	0.120	0.135	0.152	0.170	0.187	0.197	0.216
2009	0.076	0.083	0.086	0.091	0.096	0.100	0.104	0.106	0.110
2010	0.084	0.095	0.101	0.110	0.118	0.125	0.130	0.133	0.138
2011	0.092	0.103	0.109	0.117	0.124	0.130	0.135	0.137	0.142
2012	0.097	0.108	0.115	0.122	0.128	0.134	0.139	0.142	0.147
2013	0.101	0.112	0.118	0.125	0.132	0.137	0.142	0.145	0.150
2014	0.104	0.115	0.121	0.128	0.134	0.139	0.144	0.147	0.151
2015	0.105	0.116	0.122	0.129	0.136	0.141	0.146	0.148	0.153
2016	0.106	0.118	0.124	0.130	0.137	0.142	0.146	0.149	0.153
2017	0.107	0.118	0.124	0.131	0.137	0.142	0.147	0.149	0.154
2018	0.107	0.118	0.124	0.131	0.137	0.143	0.147	0.149	0.153
2019	0.108	0.119	0.125	0.131	0.138	0.143	0.147	0.150	0.154
2020	0.109	0.119	0.125	0.132	0.138	0.143	0.147	0.150	0.154
2021	0.109	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2022	0.109	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2023	0.108	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2024	0.109	0.120	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2025	0.108	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2026	0.109	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2027	0.108	0.119	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2028	0.109	0.120	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2029	0.109	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2030	0.109	0.120	0.126	0.132	0.138	0.143	0.148	0.150	0.154
2031	0.109	0.120	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2032	0.109	0.120	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2033	0.109	0.120	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2034	0.109	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2035	0.109	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2036	0.109	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2037	0.108	0.119	0.125	0.132	0.139	0.144	0.148	0.150	0.154
2038	0.108	0.120	0.126	0.132	0.139	0.144	0.148	0.150	0.154
2039	0.109	0.120	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2040	0.108	0.120	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2041	0.108	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2042	0.108	0.120	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2043	0.109	0.119	0.126	0.132	0.138	0.143	0.148	0.150	0.154
2044	0.110	0.121	0.126	0.132	0.138	0.143	0.148	0.150	0.154
2045	0.109	0.119	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2046	0.108	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2047	0.109	0.120	0.126	0.132	0.138	0.144	0.148	0.150	0.154

2048	0.108	0.119	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2049	0.108	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2050	0.108	0.119	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2051	0.108	0.120	0.126	0.132	0.138	0.144	0.148	0.150	0.154
2052	0.109	0.120	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2053	0.109	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2054	0.108	0.119	0.125	0.132	0.138	0.143	0.148	0.150	0.154
2055	0.108	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2056	0.109	0.119	0.125	0.132	0.138	0.144	0.148	0.150	0.154
2057	0.109	0.119	0.125	0.132	0.139	0.144	0.148	0.150	0.155

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD:******

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	5.788	0.923
2009	7.062	1.050
2010	8.830	1.349
2011	10.167	1.625

2012	11.027	1.792
2013	11.836	1.936
2014	12.442	2.057
2015	12.858	2.110
2016	13.129	2.124
2017	13.317	2.132
2018	13.453	2.137
2019	13.547	2.141
2020	13.618	2.151
2021	13.670	2.162
2022	13.706	2.160
2023	13.723	2.139
2024	13.735	2.132
2025	13.749	2.139
2026	13.756	2.145
2027	13.754	2.157
2028	13.755	2.166
2029	13.762	2.176
2030	13.755	2.172
2031	13.744	2.160
2032	13.739	2.153
2033	13.745	2.152
2034	13.754	2.140
2035	13.762	2.139
2036	13.765	2.137
2037	13.768	2.145
2038	13.767	2.151
2039	13.766	2.165
2040	13.766	2.158
2041	13.769	2.151
2042	13.768	2.141
2043	13.767	2.145
2044	13.751	2.133
2045	13.753	2.132
2046	13.756	2.139
2047	13.748	2.130
2048	13.747	2.114
2049	13.765	2.125
2050	13.767	2.139
2051	13.759	2.137
2052	13.761	2.143
2053	13.772	2.155
2054	13.782	2.145
2055	13.790	2.143
2056	13.793	2.156
2057	13.792	2.163

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	4.100	4.479	4.689	5.120	5.670	6.357	7.065	7.401	8.303
2009	5.144	5.551	5.794	6.294	6.947	7.723	8.493	8.971	9.849
2010	6.455	6.972	7.283	7.869	8.645	9.578	10.624	11.325	12.941
2011	7.412	8.024	8.366	9.007	9.911	11.008	12.407	13.342	15.010
2012	8.030	8.695	9.041	9.752	10.700	11.967	13.554	14.459	16.438
2013	8.620	9.314	9.695	10.435	11.477	12.927	14.549	15.453	17.666
2014	9.013	9.748	10.131	10.932	12.068	13.617	15.246	16.314	18.588
2015	9.249	10.044	10.464	11.310	12.507	14.107	15.793	16.817	18.850
2016	9.485	10.246	10.717	11.591	12.787	14.374	16.043	17.139	19.254
2017	9.594	10.424	10.885	11.805	12.970	14.550	16.274	17.323	19.465
2018	9.698	10.530	11.006	11.915	13.111	14.690	16.380	17.393	19.642
2019	9.838	10.608	11.108	11.992	13.204	14.824	16.477	17.524	19.568
2020	9.909	10.656	11.167	12.073	13.267	14.901	16.585	17.629	19.792
2021	9.964	10.719	11.201	12.096	13.306	14.943	16.633	17.678	19.912
2022	9.997	10.757	11.241	12.132	13.362	14.958	16.682	17.699	19.915
2023	10.026	10.762	11.255	12.191	13.376	15.019	16.603	17.709	19.835
2024	10.013	10.800	11.265	12.213	13.408	15.026	16.603	17.704	19.827
2025	9.981	10.815	11.313	12.200	13.434	15.026	16.653	17.720	19.778
2026	10.002	10.842	11.320	12.180	13.431	15.028	16.668	17.750	19.962
2027	10.034	10.822	11.281	12.187	13.412	15.031	16.686	17.794	19.897
2028	9.988	10.809	11.283	12.176	13.389	15.044	16.757	17.875	19.885
2029	9.980	10.774	11.278	12.164	13.407	15.050	16.780	17.833	19.945

2030	9.924	10.776	11.265	12.170	13.424	15.057	16.759	17.824	19.706
2031	9.961	10.767	11.260	12.161	13.389	15.062	16.686	17.733	19.792
2032	10.020	10.810	11.264	12.168	13.373	15.038	16.716	17.648	19.885
2033	9.982	10.797	11.290	12.190	13.401	15.040	16.715	17.760	19.793
2034	10.019	10.795	11.295	12.197	13.404	15.048	16.681	17.725	19.946
2035	10.052	10.820	11.289	12.215	13.449	15.075	16.704	17.722	19.738
2036	10.038	10.846	11.309	12.214	13.428	15.043	16.717	17.769	19.832
2037	10.021	10.848	11.302	12.208	13.420	15.064	16.706	17.775	19.842
2038	9.976	10.841	11.303	12.218	13.412	15.067	16.737	17.783	19.718
2039	9.961	10.825	11.296	12.191	13.409	15.056	16.740	17.855	19.827
2040	9.962	10.834	11.296	12.194	13.436	15.046	16.728	17.828	19.943
2041	9.990	10.820	11.310	12.206	13.436	15.090	16.718	17.718	19.892
2042	9.967	10.847	11.347	12.215	13.434	15.064	16.662	17.728	19.864
2043	10.027	10.857	11.326	12.219	13.408	15.051	16.698	17.702	19.851
2044	10.087	10.868	11.315	12.212	13.398	15.016	16.652	17.706	19.841
2045	10.068	10.843	11.321	12.225	13.398	15.020	16.641	17.751	20.016
2046	9.994	10.828	11.329	12.216	13.411	14.997	16.656	17.686	20.104
2047	10.033	10.838	11.330	12.210	13.413	15.000	16.633	17.684	19.855
2048	10.055	10.841	11.304	12.220	13.427	14.985	16.594	17.651	19.778
2049	9.965	10.811	11.300	12.247	13.447	15.006	16.633	17.656	19.805
2050	10.003	10.819	11.307	12.217	13.439	15.026	16.641	17.729	19.994
2051	9.991	10.800	11.323	12.248	13.430	14.993	16.693	17.725	19.902
2052	9.984	10.791	11.297	12.235	13.411	15.049	16.643	17.729	19.955
2053	9.972	10.801	11.313	12.223	13.422	15.069	16.725	17.717	19.969
2054	10.056	10.852	11.320	12.231	13.443	15.058	16.723	17.716	19.946
2055	10.008	10.815	11.307	12.228	13.475	15.105	16.772	17.717	19.702
2056	9.981	10.808	11.289	12.223	13.459	15.102	16.805	17.776	19.812
2057	10.028	10.821	11.309	12.210	13.482	15.081	16.752	17.757	20.045

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	1.000
2009	1.000
2010	1.000
2011	1.000
2012	1.000
2013	1.000
2014	1.000
2015	1.000
2016	1.000
2017	1.000
2018	1.000
2019	1.000
2020	1.000
2021	1.000
2022	1.000
2023	1.000
2024	1.000
2025	1.000
2026	1.000
2027	1.000
2028	1.000
2029	1.000
2030	1.000
2031	1.000
2032	1.000
2033	1.000
2034	1.000
2035	1.000
2036	1.000
2037	1.000
2038	1.000
2039	1.000
2040	1.000
2041	1.000
2042	1.000
2043	1.000
2044	1.000
2045	1.000
2046	1.000
2047	1.000

2048	1.000
2049	1.000
2050	1.000
2051	1.000
2052	1.000
2053	1.000
2054	1.000
2055	1.000
2056	1.000
2057	1.000

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	8263.222	3875.803
2009	8404.078	3962.220
2010	8294.255	3896.870
2011	8268.153	3881.413
2012	8266.335	3800.879
2013	8315.471	3899.696
2014	8234.246	3809.346
2015	8263.597	3848.446
2016	8319.815	3895.289
2017	8271.339	3858.611
2018	8335.838	3867.374
2019	8311.022	3916.032
2020	8315.513	3930.057
2021	8279.216	3799.129
2022	8266.178	3835.558
2023	8327.477	3912.363
2024	8310.938	3873.352
2025	8273.299	3933.107
2026	8276.406	3872.249
2027	8337.729	3974.120
2028	8256.353	3825.322
2029	8259.345	3874.261
2030	8249.962	3870.065
2031	8311.120	3896.619
2032	8333.388	3848.706
2033	8327.631	3878.343
2034	8283.842	3867.534
2035	8301.272	3967.482
2036	8276.908	3843.354
2037	8303.099	3897.577
2038	8284.795	3856.878
2039	8338.830	3967.041
2040	8258.982	3858.221
2041	8355.777	3920.130
2042	8176.907	3685.960
2043	8307.567	3893.462
2044	8344.671	3936.229
2045	8237.803	3844.541
2046	8272.569	3888.833
2047	8378.285	3971.020
2048	8297.261	3907.654
2049	8253.013	3838.158
2050	8288.355	3855.585
2051	8327.549	3937.203
2052	8348.541	3924.184
2053	8339.855	3968.246
2054	8305.632	3919.662
2055	8301.516	3924.439
2056	8289.504	3874.852
2057	8329.063	3885.611

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%

2008	3652.255	3922.486	4979.104	5866.262	7331.224	9632.720	11908.619	17208.662	22694.390
2009	3662.188	3930.216	5331.891	5885.641	7396.222	9695.456	12237.659	18431.082	22689.595
2010	3648.409	3923.690	5161.491	5871.882	7352.570	9568.408	11912.947	17588.857	22682.384
2011	3636.361	3924.950	5266.776	5867.331	7338.930	9575.506	11913.000	17121.803	22733.555
2012	3667.487	3933.413	5313.146	5873.623	7354.618	9595.359	11905.084	16440.324	22665.931
2013	3654.825	3923.510	5156.227	5875.106	7370.354	9637.377	12038.201	17410.309	22657.115
2014	3632.992	3925.502	5281.049	5869.517	7347.627	9501.020	11886.433	16277.506	22662.376
2015	3652.205	3923.534	5276.815	5867.316	7342.814	9594.034	11916.584	16821.020	22675.813
2016	3661.321	3930.464	5266.273	5868.021	7379.726	9601.435	11951.985	17579.784	22631.991
2017	3660.178	3925.963	5268.459	5873.806	7351.136	9517.566	12029.771	17101.926	22643.866
2018	3652.756	3930.192	5280.725	5877.925	7420.911	9655.573	11953.579	17310.706	22638.174
2019	3653.394	3924.748	5103.257	5871.061	7392.054	9578.375	11911.669	17913.964	22650.471
2020	3670.970	3923.415	5225.754	5872.733	7365.354	9590.981	11910.567	17876.413	22690.724
2021	3644.769	3928.887	5265.581	5875.788	7395.208	9589.825	11900.799	16705.047	22657.673
2022	3647.705	3923.633	5245.977	5871.346	7354.636	9585.917	11934.645	16700.453	22699.239
2023	3650.762	3926.928	5268.214	5871.755	7402.878	9580.792	11986.048	17827.947	22710.975
2024	3664.276	3930.039	5321.146	5876.315	7358.450	9592.569	11929.602	17357.672	22704.171
2025	3642.552	3921.452	5089.059	5867.858	7315.018	9546.723	12013.361	17900.201	22744.531
2026	3633.444	3925.017	5224.148	5871.757	7353.153	9556.957	11926.226	17306.852	22689.031
2027	3670.205	3926.858	5213.700	5869.200	7359.878	9616.679	12007.731	18427.990	22725.677
2028	3651.083	3928.868	5272.525	5871.304	7339.237	9572.793	11885.700	16590.127	22666.731
2029	3644.144	3922.753	5025.601	5863.282	7342.943	9592.768	11904.762	17170.930	22634.202
2030	3643.397	3922.823	5229.386	5872.068	7337.619	9515.766	11877.784	17163.856	22683.114
2031	3642.214	3925.804	5251.281	5871.219	7391.332	9588.994	11981.719	17270.209	22707.928
2032	3666.351	3927.708	5278.749	5875.403	7424.398	9668.352	12011.551	16844.311	22693.755
2033	3649.812	3930.546	5314.540	5874.863	7400.318	9640.935	11978.297	17176.320	22697.122
2034	3668.284	3925.619	5209.169	5870.158	7354.069	9540.978	11914.886	17417.684	22702.331
2035	3660.885	3923.530	5049.033	5863.974	7332.351	9579.517	11986.686	18299.135	22680.517
2036	3639.401	3927.963	5330.772	5870.117	7369.634	9549.421	11892.438	17077.809	22687.388
2037	3655.436	3924.992	5223.800	5872.701	7381.729	9577.091	11916.076	17847.817	22720.798
2038	3638.874	3920.992	5210.058	5869.498	7383.335	9607.975	11885.601	17270.391	22671.095
2039	3637.972	3925.068	5201.673	5873.126	7357.943	9648.145	11996.927	18370.338	22741.702
2040	3653.725	3921.726	5033.280	5866.806	7346.694	9586.653	11910.316	16955.134	22662.053
2041	3654.311	3930.132	5301.377	5878.997	7428.577	9595.085	11906.375	18011.145	22713.988
2042	3642.873	3925.078	5269.379	5867.925	7357.322	9528.979	11858.862	15084.330	22595.594
2043	3655.123	3930.672	5315.060	5877.336	7377.912	9561.108	11895.260	17824.094	22709.070
2044	3655.727	3930.748	5344.432	5876.095	7338.938	9646.603	11977.569	17941.221	22681.772
2045	3633.816	3919.274	5104.733	5864.796	7316.374	9550.550	11899.412	16891.855	22678.695
2046	3640.209	3922.588	5019.070	5864.063	7364.639	9592.645	11888.747	17495.810	22722.986
2047	3672.387	3930.867	5267.650	5872.224	7400.278	9682.000	12060.223	18300.656	22670.630
2048	3644.485	3922.102	5069.666	5863.626	7377.922	9608.267	11992.124	17432.605	22704.711
2049	3657.966	3928.789	5271.251	5872.954	7357.512	9524.206	11907.992	17185.160	22625.376
2050	3646.969	3920.770	5051.216	5874.218	7360.164	9651.261	11908.398	17031.730	22655.078
2051	3646.715	3925.479	5190.446	5868.149	7371.172	9588.689	12000.070	17741.354	22736.318
2052	3667.168	3927.153	5309.456	5882.476	7400.041	9650.005	11909.435	17806.618	22733.415
2053	3649.578	3925.607	5139.879	5872.055	7368.975	9621.075	12014.913	18129.870	22743.502
2054	3630.749	3923.046	5267.650	5862.761	7361.870	9600.337	11945.167	17768.749	22654.669
2055	3657.062	3925.421	5274.418	5872.807	7318.805	9599.067	11923.566	17745.728	22714.407
2056	3635.573	3930.269	5259.911	5874.528	7370.509	9567.270	11903.396	17396.394	22645.254
2057	3648.978	3924.906	5242.819	5875.134	7404.811	9638.439	11973.263	17509.423	22674.157

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	0.727	0.000
2009	0.585	0.115
2010	0.879	0.141
2011	1.062	0.159
2012	1.192	0.196
2013	1.315	0.226
2014	1.405	0.250
2015	1.466	0.259
2016	1.508	0.262
2017	1.536	0.263
2018	1.555	0.263
2019	1.569	0.264
2020	1.578	0.264
2021	1.586	0.266
2022	1.592	0.267
2023	1.595	0.268
2024	1.597	0.265
2025	1.598	0.263

2026	1.599	0.264
2027	1.600	0.265
2028	1.600	0.267
2029	1.600	0.268
2030	1.601	0.269
2031	1.600	0.269
2032	1.599	0.267
2033	1.598	0.266
2034	1.598	0.266
2035	1.599	0.265
2036	1.601	0.264
2037	1.602	0.264
2038	1.602	0.265
2039	1.601	0.266
2040	1.601	0.268
2041	1.601	0.267
2042	1.601	0.265
2043	1.601	0.265
2044	1.602	0.265
2045	1.600	0.265
2046	1.599	0.263
2047	1.600	0.263
2048	1.599	0.263
2049	1.599	0.262
2050	1.601	0.263
2051	1.601	0.265
2052	1.601	0.265
2053	1.601	0.266
2054	1.601	0.266
2055	1.603	0.266
2056	1.604	0.265
2057	1.605	0.267

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727
2009	0.370	0.421	0.446	0.502	0.571	0.658	0.742	0.784	0.905
2010	0.620	0.675	0.710	0.777	0.863	0.967	1.074	1.136	1.268
2011	0.779	0.840	0.877	0.948	1.041	1.152	1.278	1.358	1.527
2012	0.870	0.941	0.980	1.055	1.159	1.288	1.458	1.580	1.793
2013	0.951	1.031	1.069	1.155	1.269	1.425	1.634	1.762	1.988
2014	0.999	1.088	1.135	1.225	1.355	1.540	1.760	1.880	2.167
2015	1.040	1.132	1.179	1.277	1.418	1.610	1.826	1.959	2.251
2016	1.071	1.164	1.214	1.318	1.460	1.656	1.875	2.005	2.270
2017	1.091	1.185	1.241	1.346	1.489	1.684	1.904	2.036	2.295
2018	1.103	1.205	1.260	1.368	1.508	1.703	1.929	2.053	2.335
2019	1.117	1.213	1.271	1.381	1.523	1.716	1.934	2.067	2.347
2020	1.128	1.221	1.280	1.387	1.534	1.729	1.944	2.077	2.330
2021	1.140	1.229	1.286	1.394	1.540	1.738	1.955	2.088	2.354
2022	1.146	1.234	1.290	1.398	1.546	1.745	1.964	2.095	2.385
2023	1.145	1.239	1.294	1.403	1.548	1.747	1.968	2.103	2.385
2024	1.150	1.238	1.297	1.408	1.551	1.751	1.963	2.097	2.368
2025	1.149	1.242	1.297	1.410	1.554	1.750	1.955	2.092	2.358
2026	1.143	1.245	1.301	1.408	1.557	1.749	1.966	2.099	2.340
2027	1.146	1.247	1.305	1.407	1.558	1.748	1.969	2.096	2.377
2028	1.147	1.244	1.299	1.409	1.556	1.749	1.966	2.106	2.386
2029	1.144	1.242	1.299	1.405	1.552	1.753	1.975	2.118	2.369
2030	1.145	1.242	1.297	1.406	1.553	1.756	1.980	2.111	2.373
2031	1.139	1.238	1.296	1.405	1.554	1.757	1.974	2.112	2.365
2032	1.143	1.239	1.296	1.404	1.553	1.757	1.968	2.097	2.353
2033	1.145	1.242	1.295	1.405	1.550	1.753	1.968	2.085	2.367
2034	1.145	1.240	1.299	1.408	1.551	1.751	1.968	2.098	2.364
2035	1.148	1.242	1.300	1.409	1.551	1.754	1.966	2.097	2.371
2036	1.149	1.243	1.303	1.410	1.556	1.754	1.966	2.095	2.351
2037	1.150	1.244	1.301	1.411	1.554	1.753	1.972	2.099	2.353
2038	1.145	1.247	1.303	1.411	1.557	1.754	1.968	2.103	2.367
2039	1.143	1.244	1.301	1.411	1.554	1.756	1.974	2.104	2.351
2040	1.138	1.243	1.300	1.408	1.554	1.758	1.973	2.109	2.361
2041	1.138	1.244	1.299	1.406	1.556	1.752	1.970	2.108	2.383
2042	1.146	1.242	1.302	1.411	1.556	1.753	1.966	2.096	2.373
2043	1.140	1.248	1.305	1.412	1.556	1.753	1.972	2.103	2.364

2044	1.145	1.247	1.303	1.411	1.555	1.754	1.972	2.098	2.369
2045	1.155	1.246	1.303	1.410	1.551	1.754	1.966	2.099	2.379
2046	1.156	1.245	1.304	1.411	1.552	1.746	1.960	2.094	2.389
2047	1.150	1.243	1.305	1.410	1.557	1.747	1.962	2.092	2.383
2048	1.146	1.245	1.305	1.410	1.554	1.748	1.958	2.091	2.364
2049	1.150	1.246	1.301	1.410	1.556	1.746	1.962	2.085	2.358
2050	1.146	1.244	1.302	1.414	1.558	1.751	1.959	2.086	2.360
2051	1.149	1.243	1.301	1.411	1.557	1.750	1.963	2.097	2.373
2052	1.141	1.243	1.303	1.413	1.556	1.750	1.966	2.101	2.382
2053	1.145	1.242	1.301	1.412	1.554	1.753	1.959	2.100	2.387
2054	1.142	1.242	1.300	1.411	1.555	1.754	1.966	2.098	2.381
2055	1.145	1.246	1.304	1.411	1.559	1.758	1.965	2.099	2.391
2056	1.152	1.245	1.302	1.411	1.559	1.756	1.972	2.094	2.365
2057	1.147	1.244	1.301	1.411	1.559	1.758	1.982	2.103	2.363

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	6836.	6930.	7001.	7090.	7204.	7331.	7458.	7511.	7624.
2	994.	1440.	1709.	2213.	2871.	3730.	4822.	5622.	7461.
3	3453.	4259.	4662.	5530.	6606.	7883.	9063.	9913.	12104.
4	1246.	1489.	1628.	1937.	2290.	2681.	3094.	3360.	3911.
5	229.	304.	373.	471.	601.	769.	938.	1043.	1276.
6+	62.	80.	93.	113.	139.	173.	203.	221.	258.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	3636.	3930.	5260.	5875.	7371.	9567.	11903.	17396.	22645.
2	2993.	3212.	4316.	4806.	5990.	7856.	9758.	14523.	18589.
3	2383.	2575.	3458.	3849.	4833.	6302.	7841.	11664.	14872.
4	1748.	1881.	2462.	2813.	3530.	4609.	5756.	8686.	10896.
5	1203.	1288.	1741.	1929.	2427.	3165.	3906.	5840.	7456.
6+	3978.	4397.	4620.	5066.	5683.	6453.	7542.	8398.	9638.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.259	0.050
2009	0.149	0.000
2010	0.179	0.000
2011	0.179	0.000
2012	0.179	0.000
2013	0.179	0.000
2014	0.179	0.000
2015	0.179	0.000
2016	0.179	0.000
2017	0.179	0.000
2018	0.179	0.000
2019	0.179	0.000
2020	0.179	0.000
2021	0.179	0.000
2022	0.179	0.000
2023	0.179	0.000
2024	0.179	0.000
2025	0.179	0.000
2026	0.179	0.000
2027	0.179	0.000
2028	0.179	0.000
2029	0.179	0.000
2030	0.179	0.000
2031	0.179	0.000
2032	0.179	0.000
2033	0.179	0.000
2034	0.179	0.000
2035	0.179	0.000
2036	0.179	0.000
2037	0.179	0.000
2038	0.179	0.000
2039	0.179	0.000
2040	0.179	0.000
2041	0.179	0.000
2042	0.179	0.000
2043	0.179	0.000

2044	0.179	0.000
2045	0.179	0.000
2046	0.179	0.000
2047	0.179	0.000
2048	0.179	0.000
2049	0.179	0.000
2050	0.179	0.000
2051	0.179	0.000
2052	0.179	0.000
2053	0.179	0.000
2054	0.179	0.000
2055	0.179	0.000
2056	0.179	0.000
2057	0.179	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.165	0.189	0.200	0.223	0.256	0.288	0.324	0.344	0.398
2009	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
2010	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2011	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2012	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2013	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2014	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2015	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2016	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2017	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2018	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2019	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2020	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2021	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2022	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2023	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2024	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2025	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2026	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2027	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2028	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2029	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2030	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2031	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2032	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2033	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2034	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2035	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2036	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2037	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2038	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2039	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2040	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2041	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2042	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2043	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2044	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2045	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2046	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2047	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2048	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2049	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2050	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2051	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2052	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2053	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2054	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2055	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2056	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179
2057	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179	0.179

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.239

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.628

2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

American Plaice

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AGEPRO VERSION 3.2

 PROJECTION RUN: Am. plaice F40%  TY07 wts

 INPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\HAMPL\H_AMPL_NEWEST08CAT_75%FMSY.IN
 OUTPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\HAMPL\H_AMPL_NEWEST08CAT_75%FMSY.OUT
 RECRUITMENT MODEL:   14
 NUMBER OF BOOTSTRAP REALIZATIONS:   1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:   100
 TOTAL NUMBER OF SIMULATIONS:   100000
 NUMBER OF FEASIBLE SIMULATIONS:   100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:   1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             1.348
 2009  0.090
 2010  0.143
 2011  0.143
 2012  0.143
 2013  0.143
 2014  0.143
 2015  0.143
 2016  0.143
 2017  0.143
 2018  0.143
 2019  0.143
 2020  0.143
 2021  0.143
 2022  0.143
 2023  0.143
 2024  0.143
 2025  0.143
 2026  0.143
 2027  0.143
 2028  0.143
 2029  0.143
 2030  0.143
 2031  0.143
 2032  0.143
 2033  0.143
 2034  0.143
 2035  0.143
 2036  0.143
 2037  0.143
 2038  0.143
 2039  0.143
 2040  0.143
 2041  0.143
 2042  0.143
 2043  0.143
 2044  0.143
 2045  0.143
 2046  0.143
 2047  0.143
 2048  0.143
 2049  0.143
 2050  0.143
 2051  0.143
 2052  0.143
 2053  0.143
 2054  0.143
 2055  0.143
 2056  0.143
 2057  0.143

 SPAWNING STOCK BIOMASS (THOUSAND MT)
 YEAR    AVG SSB (000 MT)    STD
 2008        13.254         1.012
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2009	18.086	1.570
2010	22.526	2.236
2011	24.670	3.239
2012	26.788	5.743
2013	27.671	6.168
2014	28.084	5.833
2015	28.169	5.441
2016	28.193	4.967
2017	27.708	4.369
2018	27.521	4.215
2019	27.198	3.683
2020	26.971	3.381
2021	26.810	3.216
2022	26.696	3.128
2023	26.616	3.085
2024	26.555	3.061
2025	26.517	3.050
2026	26.493	3.046
2027	26.473	3.044
2028	26.459	3.042
2029	26.448	3.041
2030	26.438	3.042
2031	26.430	3.045
2032	26.427	3.049
2033	26.421	3.049
2034	26.411	3.042
2035	26.403	3.034
2036	26.398	3.031
2037	26.394	3.032
2038	26.388	3.031
2039	26.385	3.027
2040	26.381	3.027
2041	26.381	3.033
2042	26.384	3.037
2043	26.386	3.037
2044	26.386	3.036
2045	26.389	3.040
2046	26.389	3.041
2047	26.388	3.040
2048	26.391	3.038
2049	26.390	3.038
2050	26.389	3.036
2051	26.391	3.032
2052	26.393	3.031
2053	26.390	3.031
2054	26.388	3.027
2055	26.386	3.025
2056	26.388	3.025
2057	26.393	3.023

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	10.927	11.639	11.991	12.581	13.199	13.935	14.586	14.926	15.685
2009	14.737	15.417	16.158	16.966	18.030	19.065	20.271	20.824	21.841
2010	17.950	19.105	19.739	20.995	22.399	23.898	25.399	26.413	28.293
2011	18.466	20.103	20.944	22.434	24.296	26.431	28.805	30.559	34.678
2012	18.651	20.386	21.406	23.109	25.699	28.758	33.599	37.227	48.479
2013	19.132	20.886	21.890	23.801	26.408	29.801	34.883	38.941	51.027
2014	19.649	21.422	22.402	24.380	26.975	30.232	34.838	38.666	49.842
2015	19.988	21.666	22.693	24.654	27.209	30.357	34.516	37.953	47.861
2016	20.263	21.934	22.968	24.928	27.417	30.410	34.084	37.028	45.438
2017	20.213	21.855	22.877	24.748	27.141	29.942	33.000	35.331	41.900
2018	20.135	21.776	22.773	24.640	27.022	29.746	32.666	34.862	40.777
2019	20.249	21.827	22.806	24.624	26.868	29.368	31.875	33.581	37.713
2020	20.316	21.857	22.805	24.576	26.741	29.090	31.396	32.822	35.900
2021	20.321	21.855	22.795	24.517	26.631	28.874	31.059	32.378	34.983
2022	20.302	21.842	22.772	24.460	26.537	28.746	30.828	32.103	34.553
2023	20.305	21.833	22.727	24.398	26.457	28.646	30.696	31.950	34.376
2024	20.303	21.790	22.697	24.369	26.393	28.572	30.618	31.866	34.225
2025	20.286	21.778	22.675	24.336	26.359	28.530	30.571	31.804	34.113
2026	20.247	21.760	22.651	24.325	26.334	28.497	30.548	31.756	34.092

2027	20.238	21.750	22.638	24.310	26.309	28.471	30.530	31.752	34.047
2028	20.213	21.718	22.628	24.277	26.309	28.464	30.500	31.745	33.994
2029	20.240	21.712	22.624	24.264	26.295	28.456	30.490	31.729	34.026
2030	20.255	21.697	22.606	24.267	26.284	28.453	30.489	31.717	34.023
2031	20.217	21.700	22.597	24.238	26.282	28.436	30.465	31.703	34.042
2032	20.202	21.701	22.583	24.237	26.274	28.431	30.462	31.707	34.062
2033	20.207	21.679	22.597	24.241	26.273	28.425	30.463	31.734	34.045
2034	20.226	21.667	22.593	24.234	26.259	28.393	30.458	31.710	34.024
2035	20.251	21.682	22.571	24.242	26.254	28.413	30.434	31.689	33.956
2036	20.233	21.665	22.577	24.227	26.233	28.397	30.426	31.664	33.977
2037	20.199	21.676	22.572	24.224	26.230	28.400	30.428	31.661	33.977
2038	20.209	21.683	22.579	24.209	26.220	28.401	30.414	31.662	33.925
2039	20.212	21.689	22.577	24.213	26.225	28.380	30.410	31.639	33.900
2040	20.199	21.682	22.557	24.198	26.232	28.373	30.392	31.630	33.900
2041	20.205	21.665	22.554	24.200	26.228	28.379	30.401	31.664	33.938
2042	20.177	21.675	22.558	24.208	26.229	28.387	30.406	31.670	33.919
2043	20.187	21.669	22.565	24.211	26.218	28.395	30.424	31.656	33.962
2044	20.170	21.664	22.567	24.222	26.210	28.399	30.412	31.630	33.985
2045	20.160	21.674	22.573	24.212	26.226	28.402	30.424	31.623	34.013
2046	20.151	21.679	22.588	24.199	26.235	28.393	30.408	31.656	34.011
2047	20.166	21.694	22.569	24.205	26.232	28.396	30.416	31.655	33.986
2048	20.178	21.690	22.566	24.218	26.231	28.395	30.422	31.655	34.020
2049	20.185	21.660	22.568	24.226	26.225	28.385	30.428	31.664	33.982
2050	20.182	21.669	22.564	24.222	26.224	28.388	30.416	31.658	34.017
2051	20.169	21.674	22.585	24.229	26.234	28.378	30.396	31.645	33.990
2052	20.161	21.675	22.589	24.233	26.233	28.410	30.400	31.627	33.941
2053	20.190	21.664	22.571	24.225	26.230	28.400	30.412	31.606	33.902
2054	20.162	21.664	22.573	24.231	26.224	28.392	30.420	31.619	33.891
2055	20.187	21.660	22.586	24.230	26.233	28.397	30.401	31.617	33.911
2056	20.217	21.689	22.574	24.231	26.234	28.394	30.396	31.606	33.971
2057	20.212	21.720	22.588	24.230	26.231	28.379	30.393	31.642	33.970

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 21.940 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.006
2010	0.594
2011	0.808
2012	0.859
2013	0.897
2014	0.926
2015	0.938
2016	0.950
2017	0.946
2018	0.943
2019	0.945
2020	0.946
2021	0.946
2022	0.946
2023	0.945
2024	0.943
2025	0.943
2026	0.942
2027	0.941
2028	0.940
2029	0.940
2030	0.938
2031	0.939
2032	0.939
2033	0.937
2034	0.938
2035	0.938
2036	0.937
2037	0.938
2038	0.938
2039	0.938
2040	0.937
2041	0.937
2042	0.937
2043	0.937
2044	0.937

2045	0.938
2046	0.938
2047	0.938
2048	0.938
2049	0.937
2050	0.937
2051	0.937
2052	0.938
2053	0.937
2054	0.937
2055	0.937
2056	0.938
2057	0.939

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 11

YEAR	AVG MEAN B (000 MT)	STD
2008	21.573	1.860
2009	26.743	2.694
2010	29.771	3.973
2011	32.036	6.691
2012	33.301	7.149
2013	33.799	6.780
2014	33.945	6.300
2015	33.912	5.890
2016	33.821	5.285
2017	33.336	4.670
2018	33.137	4.478
2019	32.842	4.056
2020	32.631	3.825
2021	32.484	3.701
2022	32.379	3.638
2023	32.303	3.606
2024	32.252	3.590
2025	32.219	3.582
2026	32.193	3.580
2027	32.174	3.578
2028	32.160	3.577
2029	32.149	3.577
2030	32.138	3.580
2031	32.132	3.584
2032	32.125	3.583
2033	32.114	3.576
2034	32.104	3.567
2035	32.098	3.565
2036	32.093	3.563
2037	32.086	3.563
2038	32.082	3.560
2039	32.079	3.561
2040	32.078	3.565
2041	32.081	3.571
2042	32.083	3.571
2043	32.084	3.570
2044	32.087	3.574
2045	32.087	3.576
2046	32.086	3.574
2047	32.089	3.572
2048	32.088	3.571
2049	32.088	3.570
2050	32.088	3.565
2051	32.091	3.563
2052	32.089	3.562
2053	32.086	3.558
2054	32.085	3.556
2055	32.087	3.556
2056	32.092	3.554
2057	32.096	3.553

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	17.581	18.535	19.329	20.240	21.495	22.798	24.104	24.823	26.144
2009	21.210	22.696	23.486	24.862	26.524	28.542	30.396	31.265	33.876
2010	22.365	24.288	25.318	27.045	29.312	31.867	34.705	37.064	42.694
2011	22.555	24.565	25.750	27.759	30.771	34.336	39.970	44.184	57.341
2012	23.337	25.399	26.569	28.817	31.845	35.780	41.683	46.370	60.444
2013	23.941	25.999	27.170	29.485	32.516	36.314	41.663	46.094	59.072
2014	24.344	26.346	27.579	29.873	32.850	36.514	41.320	45.259	56.645
2015	24.586	26.539	27.762	30.052	32.975	36.512	40.876	44.371	54.494
2016	24.865	26.833	28.035	30.250	33.108	36.443	40.189	43.055	51.265
2017	24.856	26.770	27.947	30.104	32.839	35.932	39.147	41.439	47.434
2018	24.812	26.701	27.873	30.015	32.703	35.721	38.765	40.893	46.265
2019	24.915	26.744	27.888	29.984	32.550	35.352	38.113	39.868	43.744
2020	24.933	26.754	27.871	29.908	32.414	35.070	37.673	39.267	42.413
2021	24.921	26.739	27.843	29.842	32.295	34.905	37.369	38.878	41.806
2022	24.937	26.722	27.807	29.770	32.196	34.782	37.188	38.667	41.515
2023	24.918	26.693	27.757	29.729	32.115	34.672	37.081	38.556	41.311
2024	24.898	26.659	27.726	29.690	32.070	34.622	37.027	38.460	41.190
2025	24.841	26.646	27.698	29.675	32.031	34.579	36.976	38.413	41.150
2026	24.813	26.628	27.686	29.646	32.006	34.550	36.961	38.388	41.088
2027	24.782	26.599	27.676	29.613	31.992	34.537	36.926	38.383	41.037
2028	24.820	26.583	27.664	29.592	31.976	34.520	36.913	38.363	41.059
2029	24.846	26.564	27.635	29.595	31.969	34.507	36.901	38.368	41.108
2030	24.790	26.572	27.626	29.560	31.964	34.494	36.894	38.343	41.088
2031	24.774	26.561	27.616	29.566	31.960	34.483	36.871	38.343	41.079
2032	24.803	26.535	27.627	29.557	31.959	34.475	36.865	38.357	41.076
2033	24.821	26.534	27.617	29.557	31.939	34.447	36.865	38.325	41.015
2034	24.825	26.555	27.604	29.565	31.926	34.464	36.834	38.316	40.982
2035	24.818	26.520	27.611	29.550	31.903	34.450	36.832	38.280	40.992
2036	24.766	26.542	27.601	29.547	31.902	34.452	36.824	38.278	40.990
2037	24.779	26.558	27.601	29.533	31.893	34.447	36.812	38.273	40.951
2038	24.800	26.552	27.607	29.538	31.899	34.429	36.810	38.248	40.930
2039	24.787	26.539	27.590	29.529	31.914	34.425	36.795	38.259	40.922
2040	24.786	26.521	27.583	29.522	31.902	34.428	36.806	38.281	40.924
2041	24.769	26.529	27.585	29.522	31.903	34.436	36.809	38.284	40.925
2042	24.752	26.521	27.592	29.537	31.894	34.442	36.808	38.264	40.955
2043	24.733	26.521	27.593	29.542	31.881	34.453	36.823	38.256	41.016
2044	24.724	26.536	27.600	29.525	31.896	34.456	36.817	38.237	41.039
2045	24.735	26.546	27.604	29.518	31.909	34.441	36.825	38.265	41.063
2046	24.737	26.561	27.586	29.521	31.910	34.452	36.817	38.276	40.998
2047	24.738	26.546	27.593	29.535	31.897	34.449	36.821	38.272	41.038
2048	24.739	26.527	27.599	29.540	31.899	34.435	36.829	38.281	40.998
2049	24.739	26.536	27.591	29.540	31.903	34.444	36.809	38.271	41.057
2050	24.767	26.537	27.609	29.551	31.909	34.430	36.787	38.244	40.988
2051	24.743	26.540	27.611	29.550	31.908	34.454	36.793	38.249	40.952
2052	24.765	26.525	27.608	29.546	31.908	34.451	36.805	38.203	40.897
2053	24.761	26.519	27.601	29.554	31.906	34.440	36.819	38.229	40.898
2054	24.771	26.526	27.607	29.550	31.906	34.445	36.792	38.233	40.898
2055	24.800	26.560	27.606	29.554	31.909	34.441	36.799	38.221	40.982
2056	24.795	26.579	27.610	29.557	31.911	34.427	36.791	38.254	40.982
2057	24.826	26.551	27.608	29.561	31.921	34.435	36.817	38.247	40.919

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 27.497 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.361
2010	0.702
2011	0.772
2012	0.843
2013	0.883
2014	0.904
2015	0.913
2016	0.925
2017	0.921
2018	0.918
2019	0.920
2020	0.919
2021	0.918
2022	0.917
2023	0.914
2024	0.913

2025	0.912
2026	0.910
2027	0.910
2028	0.909
2029	0.908
2030	0.907
2031	0.907
2032	0.907
2033	0.907
2034	0.906
2035	0.906
2036	0.906
2037	0.906
2038	0.906
2039	0.906
2040	0.905
2041	0.905
2042	0.905
2043	0.905
2044	0.906
2045	0.906
2046	0.905
2047	0.906
2048	0.905
2049	0.905
2050	0.906
2051	0.907
2052	0.906
2053	0.905
2054	0.907
2055	0.906
2056	0.906
2057	0.907

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 11

YEAR	AVG F_WT_B	STD
2008	0.063	0.005
2009	0.059	0.003
2010	0.107	0.009
2011	0.111	0.011
2012	0.113	0.005
2013	0.115	0.006
2014	0.115	0.006
2015	0.115	0.006
2016	0.115	0.005
2017	0.115	0.005
2018	0.115	0.005
2019	0.115	0.005
2020	0.115	0.005
2021	0.114	0.005
2022	0.114	0.005
2023	0.114	0.005
2024	0.114	0.005
2025	0.114	0.005
2026	0.114	0.005
2027	0.114	0.005
2028	0.114	0.005
2029	0.114	0.005
2030	0.114	0.005
2031	0.114	0.005
2032	0.114	0.005
2033	0.114	0.005
2034	0.114	0.005
2035	0.114	0.005
2036	0.114	0.005
2037	0.114	0.005
2038	0.114	0.005
2039	0.114	0.005

2040	0.114	0.005
2041	0.114	0.005
2042	0.114	0.005
2043	0.114	0.005
2044	0.114	0.005
2045	0.114	0.005
2046	0.114	0.005
2047	0.114	0.005
2048	0.114	0.005
2049	0.114	0.005
2050	0.114	0.005
2051	0.114	0.005
2052	0.114	0.005
2053	0.114	0.005
2054	0.114	0.005
2055	0.114	0.005
2056	0.114	0.005
2057	0.114	0.005

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 11

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.051	0.054	0.056	0.059	0.063	0.067	0.070	0.073	0.076
2009	0.051	0.054	0.055	0.057	0.059	0.062	0.064	0.065	0.066
2010	0.078	0.091	0.097	0.103	0.109	0.113	0.116	0.118	0.121
2011	0.076	0.089	0.096	0.105	0.113	0.119	0.123	0.124	0.127
2012	0.102	0.105	0.107	0.110	0.114	0.117	0.119	0.121	0.123
2013	0.101	0.105	0.107	0.111	0.115	0.119	0.122	0.124	0.129
2014	0.102	0.105	0.108	0.111	0.115	0.119	0.122	0.124	0.128
2015	0.102	0.106	0.108	0.112	0.116	0.119	0.122	0.124	0.128
2016	0.102	0.106	0.108	0.112	0.116	0.119	0.122	0.124	0.127
2017	0.102	0.106	0.108	0.112	0.115	0.119	0.121	0.123	0.126
2018	0.102	0.106	0.108	0.111	0.115	0.119	0.121	0.123	0.125
2019	0.102	0.106	0.108	0.111	0.115	0.118	0.121	0.122	0.125
2020	0.102	0.106	0.108	0.111	0.115	0.118	0.121	0.122	0.124
2021	0.102	0.106	0.108	0.111	0.115	0.118	0.120	0.122	0.124
2022	0.102	0.106	0.108	0.111	0.115	0.118	0.120	0.122	0.124
2023	0.102	0.106	0.108	0.111	0.115	0.118	0.120	0.122	0.124
2024	0.102	0.106	0.108	0.111	0.115	0.118	0.120	0.121	0.124
2025	0.102	0.106	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2026	0.102	0.106	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2027	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2028	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2029	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2030	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2031	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2032	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2033	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2034	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2035	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2036	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2037	0.102	0.106	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2038	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2039	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2040	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2041	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2042	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2043	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2044	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2045	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2046	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2047	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2048	0.102	0.106	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2049	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.123
2050	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2051	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2052	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2053	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2054	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2055	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2056	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124
2057	0.102	0.105	0.107	0.111	0.115	0.118	0.120	0.121	0.124

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.147

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	18.307	1.432
2009	23.454	2.131
2010	28.059	3.066
2011	30.301	4.833
2012	32.321	6.917
2013	33.152	6.924
2014	33.567	6.457
2015	33.657	6.039
2016	33.683	5.533
2017	33.153	4.896
2018	32.952	4.733
2019	32.601	4.171
2020	32.353	3.855
2021	32.178	3.685

2022	32.054	3.595
2023	31.965	3.551
2024	31.902	3.526
2025	31.861	3.515
2026	31.833	3.510
2027	31.810	3.508
2028	31.795	3.506
2029	31.783	3.506
2030	31.771	3.507
2031	31.763	3.510
2032	31.758	3.513
2033	31.749	3.510
2034	31.738	3.501
2035	31.730	3.495
2036	31.725	3.493
2037	31.719	3.494
2038	31.713	3.492
2039	31.710	3.489
2040	31.707	3.491
2041	31.708	3.498
2042	31.711	3.500
2043	31.712	3.500
2044	31.714	3.501
2045	31.716	3.504
2046	31.715	3.505
2047	31.716	3.503
2048	31.718	3.501
2049	31.717	3.501
2050	31.716	3.497
2051	31.718	3.493
2052	31.719	3.492
2053	31.716	3.490
2054	31.715	3.486
2055	31.714	3.485
2056	31.718	3.485
2057	31.722	3.483

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	15.216	16.002	16.533	17.288	18.227	19.267	20.117	20.688	21.830
2009	18.972	20.142	20.889	21.954	23.337	24.819	26.363	27.123	29.023
2010	21.869	23.487	24.374	25.922	27.740	29.995	32.071	33.484	36.520
2011	22.231	24.215	25.258	27.090	29.647	32.405	36.044	39.177	47.794
2012	22.697	24.724	25.881	27.965	30.939	34.649	40.457	44.927	58.447
2013	23.395	25.411	26.548	28.800	31.761	35.591	41.227	45.771	59.447
2014	23.993	26.022	27.173	29.427	32.392	36.062	41.098	45.250	57.269
2015	24.326	26.282	27.469	29.739	32.633	36.190	40.754	44.455	55.273
2016	24.659	26.601	27.785	30.017	32.858	36.253	40.271	43.475	52.599
2017	24.575	26.496	27.670	29.816	32.563	35.711	39.138	41.650	48.676
2018	24.510	26.407	27.563	29.704	32.422	35.508	38.782	41.174	47.659
2019	24.623	26.467	27.597	29.673	32.256	35.094	37.929	39.810	44.319
2020	24.672	26.479	27.599	29.619	32.105	34.784	37.409	39.018	42.431
2021	24.676	26.477	27.573	29.558	31.984	34.567	37.042	38.542	41.518
2022	24.681	26.477	27.539	29.484	31.875	34.418	36.792	38.260	41.092
2023	24.688	26.451	27.492	29.433	31.780	34.303	36.667	38.098	40.814
2024	24.671	26.408	27.454	29.392	31.727	34.219	36.579	38.013	40.724
2025	24.640	26.395	27.435	29.349	31.688	34.182	36.535	37.945	40.615
2026	24.586	26.378	27.407	29.336	31.648	34.149	36.504	37.909	40.578
2027	24.574	26.345	27.398	29.311	31.633	34.129	36.478	37.891	40.511
2028	24.571	26.337	27.385	29.279	31.621	34.108	36.452	37.864	40.509
2029	24.584	26.311	27.371	29.279	31.606	34.089	36.444	37.855	40.512
2030	24.588	26.302	27.348	29.254	31.611	34.079	36.428	37.840	40.509
2031	24.561	26.296	27.342	29.244	31.603	34.066	36.411	37.840	40.513
2032	24.549	26.294	27.330	29.244	31.593	34.064	36.397	37.844	40.510
2033	24.576	26.269	27.343	29.241	31.582	34.046	36.409	37.840	40.547
2034	24.562	26.272	27.331	29.247	31.558	34.040	36.392	37.823	40.450
2035	24.582	26.279	27.330	29.243	31.545	34.041	36.369	37.801	40.426
2036	24.558	26.270	27.332	29.232	31.537	34.026	36.374	37.764	40.442
2037	24.528	26.285	27.325	29.218	31.527	34.028	36.357	37.782	40.436
2038	24.566	26.289	27.315	29.215	31.524	34.027	36.348	37.769	40.378
2039	24.560	26.284	27.310	29.219	31.538	34.010	36.344	37.762	40.361

2040	24.549	26.262	27.308	29.197	31.540	34.001	36.318	37.769	40.369
2041	24.532	26.253	27.297	29.214	31.537	34.009	36.348	37.771	40.384
2042	24.535	26.258	27.309	29.215	31.533	34.020	36.350	37.778	40.387
2043	24.497	26.257	27.312	29.213	31.527	34.020	36.348	37.759	40.394
2044	24.505	26.267	27.312	29.213	31.531	34.042	36.351	37.753	40.487
2045	24.497	26.279	27.322	29.201	31.538	34.032	36.358	37.772	40.507
2046	24.483	26.287	27.313	29.201	31.547	34.025	36.348	37.767	40.494
2047	24.482	26.298	27.310	29.213	31.537	34.038	36.342	37.757	40.441
2048	24.496	26.281	27.313	29.226	31.535	34.029	36.366	37.772	40.486
2049	24.520	26.261	27.321	29.229	31.533	34.024	36.362	37.792	40.481
2050	24.535	26.269	27.323	29.229	31.531	34.022	36.343	37.753	40.509
2051	24.517	26.272	27.327	29.231	31.560	34.023	36.330	37.774	40.420
2052	24.516	26.272	27.329	29.232	31.541	34.033	36.326	37.754	40.370
2053	24.512	26.265	27.320	29.223	31.547	34.027	36.353	37.706	40.341
2054	24.524	26.264	27.328	29.234	31.541	34.024	36.338	37.734	40.369
2055	24.524	26.274	27.325	29.227	31.544	34.016	36.332	37.717	40.413
2056	24.566	26.310	27.330	29.235	31.532	34.023	36.320	37.750	40.434
2057	24.562	26.305	27.335	29.235	31.553	34.014	36.331	37.765	40.411

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 27.103 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.051
2010	0.590
2011	0.749
2012	0.817
2013	0.868
2014	0.904
2015	0.918
2016	0.931
2017	0.926
2018	0.922
2019	0.924
2020	0.925
2021	0.924
2022	0.923
2023	0.921
2024	0.920
2025	0.918
2026	0.917
2027	0.916
2028	0.916
2029	0.915
2030	0.914
2031	0.914
2032	0.913
2033	0.913
2034	0.912
2035	0.912
2036	0.913
2037	0.912
2038	0.912
2039	0.912
2040	0.911
2041	0.911
2042	0.911
2043	0.912
2044	0.912
2045	0.913
2046	0.912
2047	0.912
2048	0.912
2049	0.912
2050	0.912
2051	0.913
2052	0.913
2053	0.912
2054	0.912
2055	0.913
2056	0.913
2057	0.913

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	28698.796	10733.726
2009	28663.387	10734.517
2010	28723.701	10736.695
2011	28647.356	10706.538
2012	28690.775	10702.425
2013	28608.254	10667.767
2014	28656.820	10701.453
2015	28694.133	10732.258
2016	28667.740	10705.788
2017	28682.214	10714.264
2018	28701.119	10711.291
2019	28625.372	10676.497
2020	28687.984	10718.187
2021	28727.590	10707.282
2022	28668.602	10731.495
2023	28679.663	10725.892
2024	28677.393	10716.347
2025	28670.139	10743.836
2026	28641.774	10696.465
2027	28682.627	10755.392
2028	28686.495	10716.082
2029	28593.537	10671.750
2030	28625.869	10685.403
2031	28632.250	10692.378
2032	28652.007	10713.092
2033	28604.624	10684.793
2034	28634.925	10721.180
2035	28607.946	10719.579
2036	28639.104	10688.378
2037	28662.620	10720.356
2038	28665.736	10671.045
2039	28621.655	10694.110
2040	28667.356	10738.768
2041	28652.914	10687.213
2042	28592.421	10665.122
2043	28705.991	10710.674
2044	28617.680	10699.641
2045	28631.911	10709.338
2046	28645.582	10691.004
2047	28685.754	10707.993
2048	28624.998	10686.695
2049	28624.502	10682.034
2050	28616.421	10682.928
2051	28652.902	10713.311
2052	28682.040	10739.958
2053	28681.039	10703.150
2054	28659.294	10714.301
2055	28644.586	10730.572
2056	28630.448	10694.354
2057	28616.426	10662.552

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	13365.278	15785.635	16645.108	21369.690	24684.629	38810.652	44496.340	50988.557	52905.853
2009	13328.947	15778.178	16644.190	21364.266	24658.732	38784.994	44528.327	50969.471	52910.184
2010	13316.762	15794.422	16665.427	21373.642	24701.353	38813.867	44505.429	50989.196	52931.316
2011	13314.240	15808.296	16664.785	21354.386	24644.961	38766.879	44111.381	50957.390	52959.692
2012	13371.281	15815.027	16668.737	21364.502	24672.949	38813.354	44073.313	50937.730	52902.861
2013	13344.168	15802.140	16664.069	21348.820	24629.571	38664.232	43877.077	50952.805	52889.371
2014	13362.421	15799.144	16680.112	21365.186	24665.044	38686.048	44376.614	50970.036	52879.298
2015	13354.286	15796.246	16678.103	21363.796	24684.397	38802.942	44607.957	50980.620	52932.920
2016	13365.337	15807.901	16661.872	21351.331	24667.111	38768.039	44100.219	50977.809	52940.722
2017	13329.236	15813.439	16659.270	21367.612	24678.866	38767.667	44379.303	50967.756	52916.448

2018	13314.459	15793.256	16665.378	21380.601	24692.878	38819.972	44227.875	50956.018	52909.237
2019	13362.337	15795.210	16646.877	21365.719	24682.465	38677.238	43903.438	50952.191	52891.748
2020	13424.304	15806.898	16660.332	21360.794	24685.614	38818.559	44119.655	50977.678	52926.440
2021	13339.738	15831.841	16666.888	21381.915	24707.301	38827.046	44163.140	50955.005	52900.589
2022	13300.287	15784.052	16650.247	21341.702	24648.822	38804.897	44362.242	50926.486	52885.172
2023	13308.661	15797.255	16660.401	21365.661	24686.639	38749.086	44470.746	50994.156	52910.650
2024	13383.113	15803.081	16657.322	21365.516	24668.126	38776.851	44428.270	50974.911	52928.920
2025	13359.920	15784.563	16636.604	21351.752	24668.275	38772.785	44624.393	50985.117	52935.632
2026	13288.607	15787.085	16647.705	21358.699	24674.441	38749.098	44196.636	50946.118	52884.312
2027	13357.428	15797.496	16645.668	21351.573	24659.164	38814.156	44709.694	50992.811	52927.005
2028	13367.544	15825.322	16671.421	21369.177	24686.810	38802.648	44507.665	50979.885	52918.531
2029	13346.827	15790.825	16641.356	21358.816	24657.764	38685.295	43948.520	50937.124	52878.162
2030	13319.560	15806.143	16659.239	21359.174	24638.619	38751.921	43927.816	50949.001	52888.353
2031	13315.568	15787.644	16650.951	21361.273	24672.957	38710.023	43970.613	50925.051	52898.823
2032	13372.985	15802.798	16643.705	21351.359	24658.003	38769.481	44285.897	50953.560	52902.304
2033	13314.669	15788.483	16649.772	21351.660	24638.865	38673.012	43913.177	50947.487	52883.101
2034	13336.446	15784.713	16629.147	21348.167	24641.538	38709.415	44309.009	50976.269	52936.039
2035	13326.898	15766.265	16607.419	21336.629	24647.806	38682.529	44144.348	50993.726	52889.740
2036	13315.302	15791.904	16672.588	21346.639	24669.269	38751.766	44129.652	50933.507	52907.212
2037	13318.211	15795.449	16668.850	21362.214	24669.353	38737.405	44410.080	50990.906	52909.870
2038	13334.116	15820.133	16665.451	21386.875	24690.621	38756.240	44011.461	50924.674	52908.984
2039	13359.028	15794.899	16646.121	21342.320	24645.048	38715.024	44025.630	50948.845	52886.888
2040	13338.521	15779.101	16640.309	21356.204	24657.328	38774.683	44638.663	50965.582	52897.172
2041	13248.098	15808.287	16673.057	21363.304	24670.061	38750.482	43978.739	50964.585	52892.021
2042	13279.963	15799.745	16657.297	21338.337	24672.018	38642.747	43715.091	50935.040	52901.986
2043	13354.367	15802.005	16668.281	21383.720	24696.373	38773.302	44301.917	50990.930	52929.443
2044	13327.870	15808.230	16654.232	21345.128	24631.564	38671.503	44056.588	50982.467	52906.203
2045	13293.535	15781.092	16643.226	21360.477	24645.184	38684.949	44315.712	50964.820	52914.364
2046	13343.099	15804.042	16645.664	21360.869	24660.763	38762.068	44006.277	50936.400	52918.089
2047	13345.850	15800.143	16683.259	21376.054	24677.747	38793.539	44221.075	50956.596	52900.121
2048	13298.443	15792.181	16623.004	21360.148	24655.438	38690.289	43902.979	50924.771	52898.083
2049	13300.395	15795.849	16666.352	21361.476	24669.832	38665.645	44113.738	50945.377	52883.345
2050	13344.473	15789.051	16638.939	21351.885	24661.183	38731.631	44034.597	50916.518	52890.714
2051	13340.491	15801.904	16647.451	21356.811	24662.537	38763.944	44217.482	50950.395	52921.195
2052	13299.116	15776.874	16636.238	21364.936	24666.872	38820.589	44386.791	50971.251	52914.949
2053	13406.133	15822.268	16686.299	21370.288	24673.295	38780.744	44314.762	50980.464	52923.788
2054	13278.140	15785.829	16658.937	21363.447	24653.914	38773.430	44238.606	50966.901	52887.254
2055	13327.340	15797.671	16646.759	21354.966	24618.423	38772.127	44429.691	50976.591	52914.892
2056	13305.659	15797.747	16647.170	21354.898	24647.983	38721.388	44004.071	50936.093	52901.719
2057	13306.189	15799.262	16667.234	21350.062	24666.403	38703.658	43769.685	50922.313	52885.449

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2008	1.348	0.000
2009	1.583	0.136
2010	3.172	0.313
2011	3.495	0.421
2012	3.772	0.790
2013	3.905	0.931
2014	3.926	0.859
2015	3.922	0.797
2016	3.909	0.705
2017	3.840	0.610
2018	3.811	0.580
2019	3.768	0.513
2020	3.738	0.476
2021	3.717	0.455
2022	3.702	0.444
2023	3.692	0.439
2024	3.684	0.436
2025	3.678	0.435
2026	3.675	0.434
2027	3.673	0.434
2028	3.671	0.434
2029	3.670	0.434
2030	3.668	0.434
2031	3.667	0.434
2032	3.667	0.435
2033	3.666	0.435
2034	3.665	0.434
2035	3.663	0.433

2036	3.663	0.432
2037	3.662	0.432
2038	3.661	0.432
2039	3.661	0.432
2040	3.660	0.432
2041	3.660	0.432
2042	3.661	0.433
2043	3.661	0.433
2044	3.661	0.433
2045	3.662	0.433
2046	3.662	0.434
2047	3.661	0.434
2048	3.662	0.433
2049	3.662	0.433
2050	3.661	0.433
2051	3.662	0.433
2052	3.662	0.432
2053	3.662	0.432
2054	3.661	0.432
2055	3.661	0.431
2056	3.661	0.432
2057	3.662	0.431

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1.348	1.348	1.348	1.348	1.348	1.348	1.348	1.348	1.348
2009	1.281	1.359	1.417	1.486	1.578	1.673	1.765	1.818	1.907
2010	2.529	2.675	2.785	2.958	3.156	3.357	3.584	3.721	3.992
2011	2.645	2.878	2.991	3.200	3.444	3.751	4.046	4.253	4.685
2012	2.616	2.871	3.017	3.262	3.632	4.054	4.710	5.204	6.759
2013	2.651	2.901	3.049	3.323	3.707	4.214	4.997	5.607	7.439
2014	2.708	2.957	3.097	3.382	3.757	4.235	4.920	5.489	7.165
2015	2.742	2.982	3.127	3.408	3.777	4.237	4.849	5.356	6.817
2016	2.787	3.020	3.165	3.445	3.797	4.227	4.745	5.161	6.352
2017	2.788	3.016	3.158	3.425	3.763	4.158	4.586	4.905	5.790
2018	2.782	3.008	3.148	3.411	3.747	4.127	4.527	4.823	5.586
2019	2.794	3.014	3.151	3.406	3.725	4.076	4.426	4.656	5.215
2020	2.802	3.016	3.151	3.400	3.707	4.039	4.365	4.564	4.990
2021	2.803	3.015	3.147	3.391	3.691	4.010	4.320	4.506	4.871
2022	2.799	3.013	3.145	3.384	3.679	3.994	4.289	4.471	4.818
2023	2.799	3.013	3.140	3.375	3.669	3.981	4.273	4.451	4.797
2024	2.801	3.008	3.134	3.371	3.659	3.971	4.262	4.440	4.780
2025	2.797	3.006	3.131	3.368	3.655	3.965	4.258	4.433	4.766
2026	2.795	3.003	3.128	3.365	3.652	3.961	4.255	4.429	4.761
2027	2.793	3.002	3.126	3.362	3.649	3.958	4.251	4.425	4.758
2028	2.789	2.998	3.124	3.359	3.649	3.957	4.248	4.427	4.749
2029	2.789	2.996	3.124	3.358	3.646	3.956	4.247	4.424	4.753
2030	2.794	2.994	3.122	3.357	3.644	3.955	4.246	4.423	4.753
2031	2.788	2.996	3.120	3.353	3.645	3.954	4.245	4.422	4.756
2032	2.784	2.994	3.120	3.353	3.644	3.951	4.243	4.421	4.755
2033	2.785	2.992	3.119	3.354	3.643	3.952	4.243	4.424	4.755
2034	2.789	2.990	3.120	3.353	3.641	3.948	4.245	4.421	4.756
2035	2.794	2.993	3.117	3.354	3.640	3.950	4.240	4.416	4.742
2036	2.792	2.990	3.118	3.353	3.639	3.947	4.238	4.415	4.744
2037	2.787	2.992	3.117	3.352	3.637	3.948	4.238	4.416	4.740
2038	2.787	2.991	3.118	3.349	3.637	3.948	4.238	4.415	4.737
2039	2.788	2.993	3.117	3.350	3.636	3.946	4.237	4.414	4.738
2040	2.786	2.992	3.115	3.349	3.638	3.944	4.235	4.410	4.734
2041	2.786	2.989	3.115	3.349	3.637	3.945	4.235	4.413	4.740
2042	2.782	2.990	3.115	3.349	3.638	3.946	4.237	4.416	4.737
2043	2.783	2.991	3.116	3.350	3.636	3.948	4.238	4.413	4.743
2044	2.782	2.991	3.117	3.350	3.635	3.948	4.237	4.412	4.748
2045	2.781	2.992	3.117	3.350	3.637	3.949	4.237	4.411	4.750
2046	2.779	2.992	3.120	3.348	3.638	3.947	4.236	4.414	4.753
2047	2.780	2.994	3.117	3.348	3.638	3.947	4.237	4.413	4.749
2048	2.783	2.993	3.117	3.351	3.637	3.948	4.236	4.415	4.750
2049	2.784	2.989	3.116	3.352	3.638	3.946	4.239	4.414	4.749
2050	2.783	2.989	3.117	3.351	3.637	3.946	4.238	4.415	4.752
2051	2.785	2.991	3.119	3.352	3.638	3.945	4.235	4.412	4.749
2052	2.780	2.991	3.118	3.353	3.639	3.948	4.234	4.412	4.743
2053	2.785	2.990	3.118	3.352	3.638	3.949	4.235	4.409	4.737

2054	2.782	2.989	3.118	3.352	3.638	3.947	4.237	4.408	4.736
2055	2.784	2.990	3.118	3.352	3.638	3.947	4.234	4.410	4.741
2056	2.788	2.993	3.118	3.352	3.638	3.947	4.234	4.409	4.744
2057	2.788	2.997	3.119	3.352	3.638	3.945	4.234	4.412	4.744

RETROSPECTIVE ADJUSTMENT COEFFICIENTS WERE APPLIED
TO THE POPULATION NUMBERS AT AGE IN YEAR: 2008

AGE	COEFFICIENT
1	0.624
2	0.968
3	0.952
4	0.860
5	0.821
6	0.733
7	0.677
8	0.580
9	0.480
10	0.386
11	0.630

REALIZED F SERIES

YEAR	AVG F	STD
2008	0.107	0.008
2009	0.090	0.000
2010	0.143	0.000
2011	0.143	0.000
2012	0.143	0.000
2013	0.143	0.000
2014	0.143	0.000
2015	0.143	0.000
2016	0.143	0.000
2017	0.143	0.000
2018	0.143	0.000
2019	0.143	0.000
2020	0.143	0.000
2021	0.143	0.000
2022	0.143	0.000
2023	0.143	0.000
2024	0.143	0.000
2025	0.143	0.000
2026	0.143	0.000
2027	0.143	0.000
2028	0.143	0.000
2029	0.143	0.000
2030	0.143	0.000
2031	0.143	0.000
2032	0.143	0.000
2033	0.143	0.000
2034	0.143	0.000
2035	0.143	0.000
2036	0.143	0.000
2037	0.143	0.000
2038	0.143	0.000
2039	0.143	0.000
2040	0.143	0.000
2041	0.143	0.000
2042	0.143	0.000
2043	0.143	0.000
2044	0.143	0.000
2045	0.143	0.000
2046	0.143	0.000
2047	0.143	0.000
2048	0.143	0.000
2049	0.143	0.000
2050	0.143	0.000
2051	0.143	0.000
2052	0.143	0.000
2053	0.143	0.000
2054	0.143	0.000
2055	0.143	0.000
2056	0.143	0.000

2057	0.143	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.089	0.094	0.096	0.101	0.107	0.112	0.118	0.122	0.129
2009	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
2010	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2011	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2012	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2013	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2014	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2015	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2016	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2017	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2018	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2019	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2020	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2021	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2022	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2023	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2024	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2025	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2026	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2027	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2028	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2029	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2030	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2031	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2032	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2033	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2034	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2035	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2036	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2037	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2038	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2039	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2040	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2041	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2042	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2043	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2044	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2045	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2046	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2047	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2048	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2049	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2050	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2051	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2052	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2053	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2054	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2055	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2056	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
2057	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.190

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000

2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

Witch Flounder

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 WITCH 07-f SPLIT Frebuild

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\GWITCH\G_WITCH_NEWEST08CAT_75%FMSY_INTERI
 M09.IN


 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\GWITCH\G_WITCH_NEWEST08CAT_75%FMSY_INTERI
 M09.OUT


 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:           10
 TOTAL NUMBER OF SIMULATIONS:        10000
 NUMBER OF FEASIBLE SIMULATIONS:        10000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             1.063
 2009  0.231
 2010  0.150
 2011  0.150
 2012  0.150
 2013  0.150
 2014  0.150
 2015  0.150
 2016  0.150
 2017  0.150
 2018  0.150
 2019  0.150
 2020  0.150
 2021  0.150
 2022  0.150
 2023  0.150
 2024  0.150
 2025  0.150
 2026  0.150
 2027  0.150
 2028  0.150
 2029  0.150
 2030  0.150
 2031  0.150
 2032  0.150
 2033  0.150
 2034  0.150
 2035  0.150
 2036  0.150
 2037  0.150
 2038  0.150
 2039  0.150
 2040  0.150
 2041  0.150
 2042  0.150
 2043  0.150
 2044  0.150
 2045  0.150
 2046  0.150
 2047  0.150
 2048  0.150
 2049  0.150
 2050  0.150
 2051  0.150
 2052  0.150
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2053	0.150
2054	0.150
2055	0.150
2056	0.150
2057	0.150

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	3.933	0.634
2009	4.989	0.903
2010	6.330	1.209
2011	8.238	1.728
2012	9.939	2.278
2013	11.280	2.834
2014	12.433	3.352
2015	13.750	3.832
2016	14.205	4.089
2017	14.523	4.336
2018	14.762	4.455
2019	14.925	4.499
2020	15.045	4.520
2021	15.133	4.514
2022	15.208	4.515
2023	15.263	4.514
2024	15.312	4.537
2025	15.354	4.549
2026	15.385	4.560
2027	15.415	4.583
2028	15.443	4.620
2029	15.465	4.642
2030	15.476	4.641
2031	15.479	4.653
2032	15.480	4.649
2033	15.470	4.618
2034	15.461	4.590
2035	15.452	4.556
2036	15.457	4.553
2037	15.455	4.538
2038	15.457	4.531
2039	15.462	4.538
2040	15.471	4.565
2041	15.475	4.571
2042	15.484	4.596
2043	15.483	4.603
2044	15.487	4.609
2045	15.482	4.610
2046	15.479	4.621
2047	15.467	4.606
2048	15.466	4.611
2049	15.460	4.596
2050	15.469	4.589
2051	15.459	4.556
2052	15.468	4.564
2053	15.476	4.581
2054	15.474	4.577
2055	15.484	4.570
2056	15.507	4.584
2057	15.528	4.606

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	2.698	2.976	3.144	3.482	3.892	4.347	4.756	5.036	5.620
2009	3.183	3.594	3.903	4.362	4.921	5.562	6.184	6.597	7.196
2010	4.002	4.471	4.906	5.501	6.211	7.070	7.891	8.383	9.696
2011	5.076	5.742	6.233	7.059	8.009	9.224	10.425	11.310	13.410
2012	6.023	6.867	7.410	8.382	9.595	11.101	12.718	14.118	17.536
2013	6.794	7.781	8.338	9.422	10.773	12.473	14.564	16.776	21.568
2014	7.577	8.627	9.205	10.321	11.755	13.508	16.337	19.381	24.939
2015	8.438	9.525	10.168	11.362	12.873	14.856	18.587	22.175	27.140
2016	8.758	9.870	10.480	11.654	13.170	15.211	19.877	23.493	28.047
2017	8.959	10.079	10.718	11.848	13.277	15.470	20.919	24.226	29.152

2018	9.126	10.225	10.866	11.997	13.366	15.812	21.427	24.552	30.076
2019	9.219	10.351	10.995	12.073	13.489	16.116	21.574	24.653	30.304
2020	9.264	10.456	11.089	12.154	13.567	16.448	21.706	24.690	30.523
2021	9.352	10.497	11.132	12.229	13.680	16.657	21.789	24.738	30.339
2022	9.472	10.517	11.163	12.273	13.761	16.682	21.799	24.847	30.540
2023	9.560	10.570	11.215	12.330	13.826	16.844	21.958	24.786	30.017
2024	9.560	10.622	11.237	12.366	13.854	16.872	21.891	24.945	30.268
2025	9.637	10.645	11.276	12.398	13.914	16.892	21.884	24.915	30.750
2026	9.605	10.649	11.315	12.412	13.943	16.882	22.105	24.947	30.512
2027	9.572	10.725	11.325	12.444	13.964	16.944	22.128	25.109	30.998
2028	9.557	10.738	11.344	12.444	13.989	16.973	22.108	25.189	30.997
2029	9.606	10.696	11.326	12.438	14.013	16.945	22.414	25.221	31.129
2030	9.579	10.706	11.318	12.455	13.988	17.010	22.297	25.338	30.684
2031	9.578	10.674	11.323	12.439	14.022	17.068	22.421	25.304	30.870
2032	9.561	10.718	11.321	12.444	13.988	16.998	22.371	25.328	31.316
2033	9.598	10.664	11.314	12.466	14.007	17.067	22.272	25.335	30.891
2034	9.584	10.673	11.316	12.430	13.986	17.100	22.170	25.252	30.608
2035	9.668	10.723	11.300	12.451	13.993	17.094	22.160	25.170	30.447
2036	9.632	10.720	11.320	12.464	13.977	17.077	22.193	25.316	30.673
2037	9.653	10.733	11.336	12.481	14.010	17.014	22.164	25.267	30.221
2038	9.616	10.760	11.358	12.485	14.003	17.003	22.175	25.157	30.856
2039	9.621	10.755	11.371	12.471	14.008	17.000	22.262	25.162	30.490
2040	9.589	10.744	11.369	12.473	13.995	16.976	22.342	25.241	30.498
2041	9.558	10.705	11.346	12.465	14.009	16.984	22.353	25.248	30.554
2042	9.531	10.728	11.356	12.449	14.027	17.048	22.301	25.276	30.460
2043	9.524	10.713	11.347	12.463	14.031	17.031	22.295	25.209	30.663
2044	9.563	10.722	11.345	12.465	14.028	17.032	22.308	25.289	30.645
2045	9.584	10.749	11.359	12.478	14.013	17.003	22.341	25.317	30.584
2046	9.633	10.748	11.383	12.475	13.994	16.941	22.307	25.272	30.760
2047	9.641	10.742	11.382	12.497	14.024	16.905	22.158	25.155	31.182
2048	9.682	10.754	11.381	12.483	14.013	16.969	22.185	25.158	31.517
2049	9.673	10.749	11.370	12.497	14.000	16.980	22.184	25.141	31.159
2050	9.712	10.744	11.371	12.514	14.014	16.854	22.239	25.177	31.059
2051	9.627	10.762	11.356	12.524	13.996	16.955	22.233	25.218	30.785
2052	9.594	10.749	11.365	12.515	13.999	16.933	22.211	25.391	30.834
2053	9.563	10.730	11.376	12.504	14.020	16.966	22.228	25.270	30.765
2054	9.560	10.718	11.356	12.512	14.031	17.038	22.250	25.092	30.869
2055	9.537	10.689	11.374	12.514	14.044	17.021	22.207	25.147	30.333
2056	9.580	10.698	11.372	12.511	14.078	17.062	22.332	25.021	30.301
2057	9.545	10.720	11.366	12.504	14.087	17.154	22.319	25.158	30.630

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 11.447 THOUSAND MT

YEAR	Pr(SSB >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.000
2010	0.001
2011	0.045
2012	0.207
2013	0.387
2014	0.550
2015	0.739
2016	0.783
2017	0.810
2018	0.829
2019	0.848
2020	0.858
2021	0.863
2022	0.869
2023	0.874
2024	0.878
2025	0.882
2026	0.885
2027	0.887
2028	0.889
2029	0.889
2030	0.887
2031	0.887
2032	0.885
2033	0.886
2034	0.886
2035	0.886

2036	0.887
2037	0.890
2038	0.889
2039	0.892
2040	0.893
2041	0.891
2042	0.891
2043	0.889
2044	0.890
2045	0.890
2046	0.893
2047	0.894
2048	0.893
2049	0.892
2050	0.892
2051	0.890
2052	0.892
2053	0.892
2054	0.892
2055	0.892
2056	0.891
2057	0.891

Pr(SSB >= Threshold Value) AT LEAST ONCE:= 1.000

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2008	8.426	1.573
2009	10.716	2.311
2010	12.569	2.955
2011	14.417	3.722
2012	15.866	4.372
2013	16.962	4.882
2014	17.910	5.264
2015	18.991	5.543
2016	19.388	5.680
2017	19.666	5.804
2018	19.875	5.853
2019	20.026	5.874
2020	20.145	5.895
2021	20.245	5.917
2022	20.321	5.926
2023	20.374	5.939
2024	20.422	5.961
2025	20.467	5.988
2026	20.507	6.015
2027	20.535	6.051
2028	20.565	6.081
2029	20.575	6.083
2030	20.567	6.055
2031	20.549	6.021
2032	20.544	5.996
2033	20.540	5.968
2034	20.547	5.954
2035	20.546	5.932
2036	20.554	5.938
2037	20.551	5.928
2038	20.557	5.953
2039	20.559	5.975
2040	20.577	6.008
2041	20.575	6.007
2042	20.596	6.020
2043	20.573	6.012
2044	20.568	6.022
2045	20.560	6.011
2046	20.556	6.021
2047	20.548	6.000
2048	20.554	5.991
2049	20.562	5.978
2050	20.569	5.982

2051	20.550	5.978
2052	20.556	5.979
2053	20.579	5.981
2054	20.605	5.987
2055	20.631	6.001
2056	20.655	6.024
2057	20.661	6.055

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	5.443	5.945	6.542	7.376	8.269	9.367	10.463	11.054	13.002
2009	6.458	7.379	8.019	9.153	10.391	12.057	13.667	14.742	17.514
2010	7.496	8.613	9.322	10.565	12.122	14.064	16.111	17.869	22.590
2011	8.560	9.946	10.644	12.025	13.743	15.896	18.555	21.550	28.493
2012	9.621	10.926	11.699	13.130	14.950	17.233	20.904	25.034	32.024
2013	10.336	11.703	12.514	13.946	15.816	18.203	23.094	27.892	34.278
2014	11.010	12.430	13.193	14.681	16.535	19.083	25.247	29.971	35.857
2015	11.740	13.213	14.040	15.532	17.434	20.297	27.201	31.286	37.741
2016	12.016	13.503	14.349	15.795	17.696	20.924	27.839	31.802	38.298
2017	12.137	13.672	14.532	15.970	17.827	21.350	28.231	32.099	39.381
2018	12.317	13.823	14.666	16.100	17.949	21.831	28.497	32.154	40.145
2019	12.455	13.934	14.768	16.187	18.083	22.235	28.696	32.333	39.775
2020	12.544	14.012	14.798	16.252	18.179	22.332	28.747	32.557	39.874
2021	12.653	14.054	14.880	16.342	18.321	22.562	28.951	32.516	40.013
2022	12.767	14.085	14.904	16.405	18.390	22.654	28.966	32.639	39.932
2023	12.777	14.147	14.965	16.472	18.462	22.667	28.906	32.636	39.905
2024	12.823	14.152	15.021	16.499	18.504	22.666	29.044	32.722	39.911
2025	12.760	14.228	15.077	16.510	18.524	22.758	29.148	32.941	40.668
2026	12.782	14.248	15.095	16.529	18.575	22.721	29.161	33.058	40.673
2027	12.806	14.269	15.104	16.530	18.603	22.711	29.336	33.078	40.740
2028	12.803	14.276	15.040	16.548	18.603	22.767	29.485	33.234	40.650
2029	12.757	14.264	15.065	16.545	18.624	22.852	29.576	33.308	40.959
2030	12.718	14.291	15.068	16.538	18.616	22.746	29.569	33.160	40.946
2031	12.685	14.230	15.058	16.553	18.615	22.840	29.374	33.049	40.610
2032	12.761	14.228	15.078	16.538	18.614	22.975	29.251	32.975	40.357
2033	12.873	14.278	15.052	16.544	18.604	22.997	29.347	33.049	40.286
2034	12.894	14.265	15.033	16.556	18.614	22.857	29.271	33.206	40.018
2035	12.890	14.263	15.119	16.565	18.625	22.806	29.233	33.112	39.974
2036	12.869	14.328	15.100	16.585	18.650	22.809	29.359	33.073	40.575
2037	12.801	14.337	15.120	16.612	18.644	22.881	29.349	32.791	40.369
2038	12.815	14.301	15.124	16.600	18.631	22.803	29.360	32.974	40.229
2039	12.752	14.286	15.107	16.567	18.620	22.839	29.511	33.098	40.687
2040	12.682	14.305	15.118	16.543	18.658	22.835	29.521	33.030	40.522
2041	12.741	14.286	15.098	16.560	18.676	22.844	29.401	33.208	40.311
2042	12.774	14.280	15.094	16.574	18.667	22.868	29.425	33.154	40.232
2043	12.741	14.327	15.086	16.570	18.649	22.825	29.431	32.959	40.217
2044	12.842	14.301	15.112	16.575	18.641	22.813	29.450	32.969	40.618
2045	12.882	14.308	15.124	16.616	18.640	22.730	29.266	32.898	40.948
2046	12.852	14.305	15.157	16.602	18.631	22.735	29.252	32.971	41.382
2047	12.928	14.312	15.137	16.609	18.630	22.774	29.322	33.107	40.933
2048	12.887	14.305	15.114	16.621	18.634	22.703	29.344	33.050	40.693
2049	12.818	14.313	15.115	16.641	18.633	22.720	29.363	33.088	40.696
2050	12.789	14.332	15.122	16.620	18.659	22.770	29.276	33.327	40.936
2051	12.744	14.302	15.129	16.614	18.634	22.774	29.260	33.162	40.892
2052	12.733	14.270	15.098	16.608	18.633	22.813	29.336	33.000	40.546
2053	12.741	14.258	15.147	16.647	18.679	22.913	29.334	32.886	39.712
2054	12.730	14.272	15.130	16.651	18.705	22.883	29.379	32.901	39.867
2055	12.685	14.268	15.138	16.639	18.728	22.938	29.554	33.026	40.381
2056	12.685	14.274	15.087	16.606	18.749	23.070	29.467	32.996	40.116
2057	12.811	14.258	15.116	16.620	18.696	23.157	29.660	33.409	40.471

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 15.957 THOUSAND MT

YEAR	Pr(MEAN B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.001
2009	0.028
2010	0.109
2011	0.245
2012	0.374
2013	0.482
2014	0.577
2015	0.696

2016	0.730
2017	0.751
2018	0.770
2019	0.778
2020	0.789
2021	0.793
2022	0.803
2023	0.809
2024	0.813
2025	0.816
2026	0.818
2027	0.817
2028	0.816
2029	0.817
2030	0.817
2031	0.815
2032	0.816
2033	0.816
2034	0.822
2035	0.822
2036	0.825
2037	0.825
2038	0.821
2039	0.822
2040	0.819
2041	0.822
2042	0.824
2043	0.824
2044	0.824
2045	0.826
2046	0.824
2047	0.824
2048	0.827
2049	0.824
2050	0.823
2051	0.823
2052	0.826
2053	0.825
2054	0.824
2055	0.822
2056	0.823
2057	0.824

Pr(MEAN B >= Threshold Value) AT LEAST ONCE:= 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	AVG F_WT_B	STD
2008	0.117	0.023
2009	0.094	0.012
2010	0.070	0.008
2011	0.090	0.011
2012	0.099	0.012
2013	0.102	0.012
2014	0.104	0.012
2015	0.107	0.012
2016	0.108	0.012
2017	0.108	0.012
2018	0.109	0.012
2019	0.109	0.012
2020	0.109	0.012
2021	0.109	0.012
2022	0.109	0.012
2023	0.109	0.012
2024	0.110	0.012
2025	0.110	0.012
2026	0.110	0.012
2027	0.110	0.012
2028	0.110	0.012
2029	0.110	0.012
2030	0.110	0.012

2031	0.110	0.012
2032	0.110	0.012
2033	0.110	0.012
2034	0.110	0.012
2035	0.110	0.012
2036	0.110	0.012
2037	0.110	0.012
2038	0.110	0.012
2039	0.110	0.012
2040	0.110	0.012
2041	0.110	0.012
2042	0.110	0.012
2043	0.110	0.012
2044	0.110	0.012
2045	0.110	0.012
2046	0.110	0.012
2047	0.110	0.012
2048	0.110	0.012
2049	0.110	0.012
2050	0.110	0.012
2051	0.110	0.012
2052	0.110	0.012
2053	0.110	0.012
2054	0.110	0.012
2055	0.110	0.012
2056	0.110	0.012
2057	0.110	0.012

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.072	0.085	0.090	0.101	0.115	0.130	0.146	0.161	0.177
2009	0.062	0.074	0.079	0.086	0.094	0.102	0.109	0.114	0.123
2010	0.044	0.056	0.061	0.067	0.071	0.075	0.080	0.082	0.087
2011	0.055	0.067	0.076	0.085	0.091	0.096	0.101	0.104	0.109
2012	0.061	0.074	0.083	0.093	0.101	0.107	0.112	0.115	0.120
2013	0.065	0.077	0.086	0.096	0.104	0.110	0.115	0.118	0.123
2014	0.067	0.080	0.089	0.099	0.106	0.112	0.117	0.120	0.128
2015	0.070	0.083	0.092	0.102	0.108	0.114	0.120	0.123	0.130
2016	0.071	0.083	0.093	0.103	0.109	0.115	0.121	0.124	0.130
2017	0.071	0.084	0.093	0.103	0.110	0.116	0.121	0.125	0.131
2018	0.072	0.085	0.094	0.104	0.110	0.116	0.122	0.126	0.132
2019	0.072	0.085	0.095	0.104	0.110	0.116	0.122	0.126	0.132
2020	0.073	0.085	0.095	0.104	0.110	0.117	0.122	0.126	0.132
2021	0.072	0.085	0.094	0.104	0.110	0.117	0.123	0.126	0.132
2022	0.072	0.085	0.095	0.104	0.111	0.117	0.123	0.126	0.132
2023	0.072	0.085	0.095	0.104	0.111	0.117	0.123	0.126	0.132
2024	0.072	0.085	0.095	0.104	0.111	0.117	0.123	0.126	0.131
2025	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.126	0.131
2026	0.072	0.084	0.095	0.105	0.111	0.117	0.123	0.126	0.131
2027	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.126	0.131
2028	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2029	0.073	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2030	0.073	0.086	0.095	0.105	0.111	0.117	0.124	0.127	0.132
2031	0.073	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2032	0.072	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2033	0.073	0.086	0.095	0.105	0.111	0.117	0.124	0.127	0.132
2034	0.073	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2035	0.073	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2036	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2037	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2038	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2039	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2040	0.072	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2041	0.073	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2042	0.073	0.085	0.094	0.105	0.111	0.117	0.123	0.127	0.132
2043	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2044	0.073	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2045	0.073	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2046	0.072	0.085	0.096	0.105	0.111	0.117	0.123	0.126	0.132
2047	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132

2048	0.073	0.086	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2049	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2050	0.072	0.085	0.094	0.105	0.111	0.117	0.123	0.127	0.132
2051	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2052	0.073	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132
2053	0.072	0.084	0.095	0.105	0.111	0.117	0.123	0.126	0.132
2054	0.071	0.085	0.094	0.105	0.111	0.117	0.123	0.127	0.132
2055	0.072	0.084	0.094	0.105	0.111	0.117	0.123	0.127	0.132
2056	0.072	0.085	0.094	0.105	0.111	0.117	0.123	0.127	0.132
2057	0.072	0.085	0.095	0.105	0.111	0.117	0.123	0.127	0.132

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.140

YEAR	Pr(F_WT_B > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.150
2009	0.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	9.593	1.690
2009	12.074	2.562
2010	14.001	3.251
2011	16.206	4.125

2012	17.913	4.865
2013	19.182	5.465
2014	20.281	5.924
2015	21.534	6.259
2016	21.995	6.426
2017	22.317	6.575
2018	22.559	6.634
2019	22.734	6.658
2020	22.871	6.682
2021	22.984	6.704
2022	23.072	6.713
2023	23.132	6.727
2024	23.189	6.754
2025	23.240	6.785
2026	23.286	6.812
2027	23.318	6.853
2028	23.353	6.890
2029	23.365	6.894
2030	23.358	6.865
2031	23.338	6.830
2032	23.333	6.802
2033	23.327	6.768
2034	23.333	6.749
2035	23.331	6.723
2036	23.341	6.730
2037	23.339	6.718
2038	23.345	6.745
2039	23.348	6.769
2040	23.367	6.806
2041	23.366	6.806
2042	23.389	6.823
2043	23.364	6.813
2044	23.359	6.826
2045	23.350	6.816
2046	23.345	6.826
2047	23.335	6.801
2048	23.342	6.791
2049	23.351	6.776
2050	23.358	6.779
2051	23.337	6.772
2052	23.345	6.775
2053	23.370	6.780
2054	23.397	6.783
2055	23.426	6.796
2056	23.454	6.825
2057	23.462	6.861

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	6.390	6.932	7.570	8.461	9.421	10.602	11.774	12.417	14.510
2009	7.327	8.346	9.080	10.343	11.726	13.582	15.347	16.532	19.512
2010	8.383	9.615	10.408	11.792	13.509	15.662	17.924	19.806	24.980
2011	9.661	11.202	11.970	13.534	15.466	17.900	20.852	24.111	31.639
2012	10.848	12.357	13.206	14.831	16.908	19.497	23.482	28.040	35.865
2013	11.712	13.268	14.159	15.792	17.913	20.616	25.980	31.304	38.482
2014	12.482	14.090	14.949	16.653	18.739	21.638	28.474	33.870	40.600
2015	13.317	14.980	15.917	17.622	19.778	23.019	30.814	35.401	42.515
2016	13.636	15.331	16.274	17.932	20.090	23.730	31.564	36.108	43.437
2017	13.812	15.517	16.502	18.128	20.231	24.203	32.079	36.473	44.811
2018	13.999	15.702	16.648	18.286	20.382	24.782	32.250	36.570	45.645
2019	14.148	15.810	16.774	18.392	20.539	25.268	32.553	36.710	45.395
2020	14.225	15.917	16.811	18.473	20.653	25.371	32.668	36.935	45.443
2021	14.395	15.968	16.899	18.556	20.798	25.582	32.839	36.843	45.369
2022	14.490	16.009	16.934	18.619	20.897	25.748	32.889	36.961	45.125
2023	14.509	16.078	17.007	18.711	20.961	25.753	32.805	36.991	45.307
2024	14.583	16.080	17.056	18.752	21.017	25.759	32.959	37.137	45.487
2025	14.516	16.166	17.118	18.765	21.037	25.844	33.105	37.303	46.050
2026	14.531	16.214	17.153	18.767	21.088	25.822	33.113	37.418	45.872
2027	14.545	16.226	17.164	18.778	21.125	25.802	33.315	37.492	46.409
2028	14.517	16.220	17.091	18.792	21.138	25.820	33.487	37.741	46.161
2029	14.475	16.191	17.130	18.787	21.152	25.911	33.619	37.704	46.319

2030	14.468	16.240	17.126	18.791	21.156	25.847	33.513	37.664	46.398
2031	14.432	16.159	17.107	18.814	21.148	25.943	33.355	37.492	46.137
2032	14.499	16.165	17.115	18.779	21.156	26.111	33.215	37.474	45.807
2033	14.606	16.210	17.102	18.798	21.145	26.098	33.302	37.496	45.687
2034	14.636	16.213	17.092	18.806	21.138	25.963	33.301	37.563	45.211
2035	14.652	16.221	17.162	18.812	21.157	25.927	33.215	37.493	45.504
2036	14.628	16.287	17.160	18.848	21.178	25.888	33.299	37.444	45.848
2037	14.541	16.290	17.182	18.855	21.182	25.975	33.361	37.198	45.795
2038	14.562	16.257	17.184	18.864	21.161	25.888	33.317	37.391	45.912
2039	14.501	16.243	17.166	18.826	21.149	25.908	33.471	37.488	46.279
2040	14.424	16.254	17.166	18.804	21.187	25.928	33.553	37.526	45.786
2041	14.475	16.212	17.167	18.806	21.210	25.965	33.374	37.608	45.638
2042	14.510	16.218	17.161	18.824	21.204	25.968	33.466	37.481	45.717
2043	14.495	16.258	17.146	18.809	21.188	25.924	33.415	37.512	45.812
2044	14.594	16.250	17.173	18.833	21.172	25.910	33.517	37.397	46.155
2045	14.626	16.269	17.181	18.870	21.175	25.830	33.224	37.378	46.284
2046	14.592	16.252	17.218	18.863	21.167	25.841	33.246	37.258	46.873
2047	14.677	16.274	17.212	18.862	21.169	25.883	33.291	37.538	46.253
2048	14.670	16.260	17.178	18.881	21.172	25.807	33.286	37.417	46.232
2049	14.567	16.263	17.178	18.911	21.169	25.828	33.298	37.565	46.405
2050	14.538	16.281	17.185	18.897	21.186	25.891	33.263	37.758	46.082
2051	14.481	16.252	17.198	18.866	21.156	25.847	33.289	37.580	46.202
2052	14.466	16.204	17.161	18.856	21.173	25.912	33.313	37.471	45.868
2053	14.491	16.208	17.198	18.904	21.210	26.045	33.285	37.386	45.541
2054	14.468	16.198	17.196	18.912	21.238	25.941	33.284	37.394	45.351
2055	14.407	16.203	17.204	18.892	21.276	26.054	33.466	37.432	45.721
2056	14.423	16.219	17.148	18.859	21.293	26.221	33.478	37.420	45.380
2057	14.548	16.210	17.177	18.869	21.256	26.303	33.633	37.827	45.753

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 18.380 THOUSAND MT

YEAR	Pr(B >= Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.000
2009	0.022
2010	0.083
2011	0.216
2012	0.343
2013	0.449
2014	0.543
2015	0.664
2016	0.701
2017	0.721
2018	0.738
2019	0.751
2020	0.759
2021	0.769
2022	0.776
2023	0.783
2024	0.788
2025	0.792
2026	0.793
2027	0.792
2028	0.791
2029	0.795
2030	0.795
2031	0.791
2032	0.792
2033	0.794
2034	0.794
2035	0.798
2036	0.798
2037	0.798
2038	0.798
2039	0.796
2040	0.793
2041	0.796
2042	0.799
2043	0.797
2044	0.798
2045	0.804
2046	0.800
2047	0.802

2048	0.804
2049	0.802
2050	0.803
2051	0.800
2052	0.802
2053	0.803
2054	0.799
2055	0.799
2056	0.799
2057	0.803

Pr(B >= Threshold Value) AT LEAST ONCE:= 1.000

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	13301.053	13878.908
2009	13604.196	14009.087
2010	13372.951	13783.754
2011	13425.116	14176.054
2012	13259.062	13517.287
2013	13409.340	13766.110
2014	13182.493	13316.187
2015	13277.271	13672.888
2016	13325.294	13397.479
2017	13242.470	13302.845
2018	13382.845	13496.783
2019	13420.770	13890.795
2020	13487.350	14120.954
2021	13283.217	13495.551
2022	13322.574	13786.537
2023	13517.942	14193.954
2024	13454.517	13932.175
2025	13456.642	14337.261
2026	13329.856	13778.109
2027	13539.311	14276.376
2028	13226.811	13430.522
2029	13191.734	13347.184
2030	13314.230	13792.253
2031	13453.518	14085.477
2032	13366.266	13651.505
2033	13475.259	13974.595
2034	13313.566	13664.332
2035	13375.596	13937.945
2036	13397.059	13944.193
2037	13459.576	14174.083
2038	13285.405	13517.747
2039	13576.374	14470.165
2040	13236.143	13582.454
2041	13618.693	14214.286
2042	12954.427	12783.760
2043	13444.010	13986.245
2044	13535.545	14090.020
2045	13209.294	13595.180
2046	13355.483	13994.685
2047	13539.935	13955.534
2048	13470.172	14203.074
2049	13186.240	13260.463
2050	13272.264	13458.822
2051	13568.438	14457.989
2052	13619.921	14314.435
2053	13566.412	14369.052
2054	13416.956	13896.485
2055	13435.540	14063.621
2056	13341.153	13649.479
2057	13387.333	13663.653

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%

2008	2431.413	3264.389	4414.787	7587.083	12010.047	15036.749	16858.703	23234.719	95794.627
2009	2454.102	3353.720	5004.188	7648.579	12045.818	15038.143	17262.641	24204.390	95494.602
2010	2422.628	3278.307	4623.625	7604.918	12030.803	15035.320	16881.526	23536.304	95043.471
2011	2395.107	3292.871	4751.760	7590.478	12017.540	15035.478	16881.807	23165.819	98244.913
2012	2466.206	3390.665	4931.519	7610.442	12032.795	15035.919	16840.062	22625.243	94014.109
2013	2437.283	3276.222	4617.597	7615.150	12040.811	15036.853	17039.903	23394.673	93462.557
2014	2387.412	3299.248	4807.091	7597.414	12025.997	15033.823	16741.705	22496.089	93791.701
2015	2431.298	3276.508	4790.679	7590.430	12021.316	15035.890	16900.707	22927.226	94632.360
2016	2452.123	3356.587	4749.812	7592.665	12042.625	15036.054	16943.624	23529.108	91890.656
2017	2449.512	3304.577	4758.286	7611.025	12029.409	15034.190	17030.489	23150.052	92633.647
2018	2432.557	3353.443	4805.838	7624.095	12050.597	15037.257	16945.404	23315.664	92277.504
2019	2434.014	3290.534	4556.945	7602.314	12045.011	15035.542	16874.787	23794.192	93046.846
2020	2474.163	3275.128	4697.207	7607.618	12039.843	15035.822	16868.976	23764.406	95565.253
2021	2414.313	3338.357	4747.129	7617.314	12045.622	15035.796	16817.464	22835.232	93497.466
2022	2421.020	3277.649	4720.363	7603.218	12032.811	15035.709	16924.260	22831.588	96097.967
2023	2428.003	3315.728	4757.337	7604.515	12047.106	15035.595	16981.663	23725.961	96832.264
2024	2458.870	3351.674	4962.534	7618.984	12036.521	15035.857	16918.628	23352.919	96406.532
2025	2409.250	3252.448	4540.688	7592.148	11994.289	15034.838	17012.164	23783.274	98931.655
2026	2388.445	3293.638	4695.369	7604.522	12031.370	15035.066	16914.858	23312.607	95459.333
2027	2472.415	3314.915	4683.405	7596.409	12037.909	15036.393	17005.876	24201.937	97752.090
2028	2428.737	3338.145	4774.047	7603.083	12017.838	15035.418	16737.839	22744.073	94064.154
2029	2412.886	3267.476	4468.027	7577.628	12021.442	15035.862	16838.365	23204.788	92028.977
2030	2411.179	3268.289	4701.366	7605.509	12016.265	15034.150	16696.095	23199.177	95089.157
2031	2408.476	3302.734	4726.437	7602.815	12044.871	15035.778	16976.829	23283.540	96641.641
2032	2463.612	3324.742	4798.177	7616.091	12051.272	15037.541	17010.142	22945.702	95754.900
2033	2425.834	3357.533	4936.925	7614.379	12046.611	15036.932	16973.007	23209.064	95965.514
2034	2468.026	3300.598	4678.217	7599.448	12032.260	15034.711	16891.751	23400.523	96291.453
2035	2451.125	3276.461	4494.857	7579.824	12011.143	15035.567	16982.375	24099.725	94926.632
2036	2402.052	3327.688	4999.848	7599.318	12040.671	15034.898	16773.372	23130.921	95356.522
2037	2438.680	3293.356	4694.969	7607.518	12043.013	15035.513	16898.026	23741.721	97446.840
2038	2400.848	3247.130	4679.235	7597.354	12043.323	15036.199	16737.315	23283.685	94337.176
2039	2398.788	3294.233	4669.634	7608.867	12036.027	15037.092	16993.812	24156.206	98754.677
2040	2434.770	3255.607	4476.820	7588.812	12025.090	15035.726	16867.651	23033.611	93771.468
2041	2436.108	3352.750	4885.895	7627.495	12052.081	15035.913	16846.871	23871.279	97020.739
2042	2409.982	3294.348	4761.852	7592.362	12035.424	15034.444	16596.306	21549.616	89613.509
2043	2437.965	3358.983	4938.940	7622.225	12042.274	15035.158	16788.255	23722.904	96713.082
2044	2439.343	3359.871	5052.803	7618.288	12017.548	15037.058	16972.194	23815.813	95005.180
2045	2389.294	3227.278	4558.635	7582.432	11995.607	15034.923	16810.148	22983.415	94812.665
2046	2403.899	3265.574	4460.549	7580.106	12039.704	15035.859	16753.910	23462.496	97583.693
2047	2477.399	3361.237	4755.150	7606.002	12046.603	15037.844	17064.495	24100.931	94308.076
2048	2413.664	3259.953	4518.482	7578.720	12042.276	15036.206	16988.448	23412.360	96440.324
2049	2444.458	3337.232	4769.111	7608.320	12035.609	15034.338	16855.398	23216.076	91476.841
2050	2419.338	3244.560	4497.357	7612.330	12038.187	15037.161	16857.536	23094.370	93335.105
2051	2418.758	3298.981	4656.778	7593.071	12040.969	15035.771	16997.321	23657.271	98417.837
2052	2465.476	3318.319	4917.216	7638.535	12046.557	15037.133	16863.007	23709.041	98236.160
2053	2425.297	3300.456	4598.878	7605.468	12040.544	15036.491	17013.897	23965.457	98867.244
2054	2382.290	3270.859	4755.149	7575.976	12039.168	15036.030	16936.010	23679.002	93309.506
2055	2442.392	3298.314	4781.388	7607.853	11997.972	15036.001	16911.888	23660.740	97046.935
2056	2393.308	3354.333	4736.318	7613.314	12040.841	15035.295	16831.159	23383.636	92720.478
2057	2423.928	3292.360	4716.747	7615.236	12047.480	15036.876	16967.385	23473.294	94528.783

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	1.063	0.000
2009	1.088	0.193
2010	0.959	0.180
2011	1.408	0.310
2012	1.697	0.399
2013	1.868	0.508
2014	2.011	0.603
2015	2.162	0.669
2016	2.223	0.705
2017	2.265	0.729
2018	2.297	0.739
2019	2.318	0.740
2020	2.334	0.742
2021	2.346	0.741
2022	2.356	0.739
2023	2.365	0.741
2024	2.373	0.748
2025	2.379	0.752

2026	2.383	0.750
2027	2.386	0.753
2028	2.391	0.761
2029	2.395	0.765
2030	2.397	0.766
2031	2.397	0.767
2032	2.397	0.765
2033	2.394	0.758
2034	2.391	0.749
2035	2.390	0.745
2036	2.392	0.749
2037	2.392	0.747
2038	2.393	0.746
2039	2.393	0.747
2040	2.394	0.751
2041	2.395	0.753
2042	2.397	0.759
2043	2.396	0.758
2044	2.398	0.760
2045	2.396	0.759
2046	2.397	0.761
2047	2.392	0.755
2048	2.392	0.755
2049	2.393	0.756
2050	2.393	0.754
2051	2.392	0.749
2052	2.395	0.751
2053	2.396	0.757
2054	2.394	0.754
2055	2.394	0.749
2056	2.400	0.756
2057	2.405	0.760

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063	1.063
2009	0.700	0.793	0.852	0.948	1.073	1.212	1.342	1.430	1.560
2010	0.607	0.683	0.745	0.836	0.944	1.075	1.192	1.262	1.467
2011	0.842	0.958	1.038	1.194	1.369	1.591	1.813	1.944	2.333
2012	0.990	1.142	1.238	1.417	1.639	1.918	2.204	2.405	2.969
2013	1.090	1.261	1.357	1.545	1.779	2.071	2.412	2.783	3.898
2014	1.201	1.366	1.467	1.654	1.886	2.176	2.630	3.254	4.442
2015	1.293	1.475	1.572	1.765	2.005	2.305	2.951	3.675	4.589
2016	1.337	1.517	1.616	1.805	2.035	2.349	3.157	3.849	4.739
2017	1.365	1.547	1.649	1.831	2.057	2.391	3.307	3.910	4.840
2018	1.392	1.571	1.669	1.845	2.074	2.440	3.360	3.962	4.833
2019	1.404	1.588	1.684	1.860	2.086	2.488	3.370	3.940	4.895
2020	1.406	1.595	1.697	1.875	2.098	2.523	3.403	3.946	5.001
2021	1.422	1.596	1.703	1.882	2.115	2.550	3.385	3.943	4.930
2022	1.439	1.603	1.711	1.889	2.123	2.557	3.400	3.973	4.903
2023	1.442	1.611	1.717	1.897	2.132	2.571	3.418	3.974	4.911
2024	1.454	1.618	1.718	1.902	2.141	2.577	3.430	3.994	4.956
2025	1.470	1.619	1.726	1.905	2.152	2.582	3.426	4.006	5.006
2026	1.461	1.624	1.730	1.912	2.152	2.578	3.444	4.014	4.968
2027	1.453	1.636	1.732	1.916	2.156	2.584	3.457	4.010	4.985
2028	1.448	1.635	1.739	1.914	2.155	2.588	3.457	4.036	4.998
2029	1.457	1.629	1.734	1.916	2.159	2.591	3.495	4.067	5.062
2030	1.459	1.629	1.725	1.915	2.159	2.593	3.494	4.099	4.978
2031	1.444	1.630	1.730	1.912	2.159	2.598	3.517	4.078	5.032
2032	1.444	1.633	1.735	1.912	2.158	2.597	3.494	4.067	5.030
2033	1.455	1.628	1.732	1.911	2.157	2.617	3.461	4.056	4.989
2034	1.456	1.631	1.729	1.909	2.156	2.622	3.456	4.007	4.935
2035	1.461	1.631	1.729	1.916	2.155	2.612	3.449	4.010	4.914
2036	1.458	1.631	1.734	1.915	2.157	2.601	3.449	4.052	4.937
2037	1.457	1.636	1.739	1.919	2.162	2.594	3.453	4.063	4.974
2038	1.464	1.640	1.740	1.920	2.160	2.605	3.474	4.021	4.981
2039	1.456	1.639	1.737	1.919	2.161	2.604	3.478	4.025	4.979
2040	1.448	1.639	1.737	1.918	2.160	2.608	3.475	4.027	4.975
2041	1.445	1.634	1.737	1.918	2.159	2.603	3.504	4.065	4.980
2042	1.437	1.632	1.734	1.914	2.167	2.605	3.491	4.066	4.978
2043	1.446	1.633	1.734	1.916	2.165	2.610	3.470	4.057	4.956

2044	1.450	1.633	1.740	1.919	2.162	2.609	3.491	4.047	4.999
2045	1.446	1.637	1.740	1.919	2.160	2.598	3.480	4.046	4.961
2046	1.461	1.638	1.740	1.920	2.158	2.591	3.470	4.057	4.995
2047	1.464	1.642	1.738	1.921	2.162	2.582	3.468	4.011	4.990
2048	1.468	1.641	1.744	1.921	2.159	2.583	3.460	4.011	5.054
2049	1.457	1.635	1.743	1.922	2.162	2.587	3.471	4.046	5.060
2050	1.469	1.638	1.735	1.922	2.161	2.580	3.448	4.036	5.026
2051	1.457	1.639	1.735	1.925	2.157	2.588	3.478	4.024	4.975
2052	1.447	1.635	1.739	1.923	2.162	2.588	3.479	4.032	4.987
2053	1.452	1.631	1.739	1.919	2.163	2.595	3.484	4.065	5.015
2054	1.449	1.631	1.733	1.924	2.161	2.601	3.478	4.026	5.024
2055	1.446	1.625	1.737	1.925	2.163	2.598	3.471	3.973	4.911
2056	1.447	1.633	1.735	1.921	2.171	2.604	3.469	4.008	5.009
2057	1.443	1.635	1.737	1.921	2.173	2.611	3.480	4.053	4.991

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	3332.	5133.	5992.	8081.	12375.	17286.	23789.	27443.	37958.
2	9400.	11756.	13908.	17454.	22638.	28561.	35799.	40348.	50468.
3	2452.	3120.	3546.	4375.	5414.	6706.	8051.	8849.	10817.
4	624.	774.	849.	1015.	1222.	1467.	1738.	1875.	2304.
5	722.	899.	979.	1208.	1467.	1762.	2100.	2241.	2633.
6	909.	1206.	1358.	1675.	2096.	2585.	3049.	3360.	3882.
7	342.	484.	562.	739.	950.	1216.	1515.	1693.	2147.
8	629.	775.	895.	1103.	1378.	1675.	1972.	2211.	2758.
9+	215.	262.	291.	344.	416.	491.	584.	622.	752.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	2393.	3354.	4736.	7613.	12041.	15035.	16831.	23384.	92720.
2	2099.	2835.	4110.	6539.	10313.	12924.	14537.	20338.	83416.
3	1742.	2392.	3478.	5541.	8806.	10998.	12388.	17320.	68250.
4	1476.	2009.	2799.	4629.	7329.	9152.	10356.	14587.	60176.
5	1211.	1631.	2416.	3753.	5919.	7389.	8286.	11650.	48271.
6	901.	1228.	1734.	2827.	4484.	5599.	6329.	8809.	36647.
7	667.	895.	1241.	2100.	3321.	4148.	4650.	6371.	25746.
8	500.	682.	975.	1555.	2460.	3072.	3444.	4744.	18694.
9+	4295.	4953.	5348.	6075.	6968.	8224.	11575.	14644.	20952.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.281	0.050
2009	0.231	0.000
2010	0.150	0.000
2011	0.150	0.000
2012	0.150	0.000
2013	0.150	0.000
2014	0.150	0.000
2015	0.150	0.000
2016	0.150	0.000
2017	0.150	0.000
2018	0.150	0.000
2019	0.150	0.000
2020	0.150	0.000
2021	0.150	0.000
2022	0.150	0.000
2023	0.150	0.000
2024	0.150	0.000
2025	0.150	0.000
2026	0.150	0.000
2027	0.150	0.000
2028	0.150	0.000
2029	0.150	0.000
2030	0.150	0.000
2031	0.150	0.000
2032	0.150	0.000
2033	0.150	0.000
2034	0.150	0.000
2035	0.150	0.000
2036	0.150	0.000
2037	0.150	0.000

2038	0.150	0.000
2039	0.150	0.000
2040	0.150	0.000
2041	0.150	0.000
2042	0.150	0.000
2043	0.150	0.000
2044	0.150	0.000
2045	0.150	0.000
2046	0.150	0.000
2047	0.150	0.000
2048	0.150	0.000
2049	0.150	0.000
2050	0.150	0.000
2051	0.150	0.000
2052	0.150	0.000
2053	0.150	0.000
2054	0.150	0.000
2055	0.150	0.000
2056	0.150	0.000
2057	0.150	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.188	0.208	0.219	0.244	0.276	0.311	0.350	0.372	0.417	
2009	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	
2010	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2011	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2012	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2013	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2014	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2015	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2016	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2017	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2018	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2019	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2020	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2021	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2022	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2023	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2024	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2025	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2026	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2027	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2028	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2029	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2030	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2031	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2032	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2033	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2034	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2035	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2036	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2037	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2038	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2039	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2040	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2041	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2042	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2043	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2044	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2045	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2046	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2047	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2048	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2049	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2050	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2051	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2052	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2053	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2054	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
2055	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	

2056	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
2057	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.200

YEAR	Pr(F > Threshold Value) FOR FEASIBLE SIMULATIONS
2008	0.971
2009	1.000
2010	0.000
2011	0.000
2012	0.000
2013	0.000
2014	0.000
2015	0.000
2016	0.000
2017	0.000
2018	0.000
2019	0.000
2020	0.000
2021	0.000
2022	0.000
2023	0.000
2024	0.000
2025	0.000
2026	0.000
2027	0.000
2028	0.000
2029	0.000
2030	0.000
2031	0.000
2032	0.000
2033	0.000
2034	0.000
2035	0.000
2036	0.000
2037	0.000
2038	0.000
2039	0.000
2040	0.000
2041	0.000
2042	0.000
2043	0.000
2044	0.000
2045	0.000
2046	0.000
2047	0.000
2048	0.000
2049	0.000
2050	0.000
2051	0.000
2052	0.000
2053	0.000
2054	0.000
2055	0.000
2056	0.000
2057	0.000

Georges Bank Winter Flounder

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 SSB projected out 100 yrs at F40%  R for 1982-2007 F rebuild

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\KGBWIN\K_GBWIN_NEWEST08CAT_UPDATED1017_75
 %FMSY.IN


 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\KGBWIN\K_GBWIN_NEWEST08CAT_UPDATED1017_75
 %FMSY.OUT


 RECRUITMENT MODEL:           14
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:           50
 TOTAL NUMBER OF SIMULATIONS:        50000
 NUMBER OF FEASIBLE SIMULATIONS:        50000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             0.963
 2009  0.155
 2010  0.195
 2011  0.195
 2012  0.195
 2013  0.195
 2014  0.195
 2015  0.195
 2016  0.195
 2017  0.195
 2018  0.195
 2019  0.195
 2020  0.195
 2021  0.195
 2022  0.195
 2023  0.195
 2024  0.195
 2025  0.195
 2026  0.195
 2027  0.195
 2028  0.195
 2029  0.195
 2030  0.195
 2031  0.195
 2032  0.195
 2033  0.195
 2034  0.195
 2035  0.195
 2036  0.195
 2037  0.195
 2038  0.195
 2039  0.195
 2040  0.195
 2041  0.195
 2042  0.195
 2043  0.195
 2044  0.195
 2045  0.195
 2046  0.195
 2047  0.195
 2048  0.195
 2049  0.195
 2050  0.195
 2051  0.195
 2052  0.195
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2053	0.195
2054	0.195
2055	0.195
2056	0.195
2057	0.195

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	7.424	1.573
2009	10.617	3.273
2010	12.562	3.736
2011	14.112	3.679
2012	15.516	3.473
2013	16.830	3.437
2014	17.279	3.057
2015	17.837	2.926
2016	18.210	2.862
2017	18.462	2.828
2018	18.633	2.809
2019	18.754	2.799
2020	18.837	2.794
2021	18.894	2.794
2022	18.934	2.792
2023	18.965	2.788
2024	18.985	2.784
2025	18.995	2.783
2026	19.003	2.782
2027	19.007	2.783
2028	19.006	2.783
2029	18.999	2.786
2030	18.993	2.790
2031	18.986	2.795
2032	18.975	2.788
2033	18.968	2.783
2034	18.968	2.784
2035	18.974	2.786
2036	18.975	2.789
2037	18.975	2.789
2038	18.974	2.790
2039	18.978	2.793
2040	18.984	2.796
2041	18.992	2.789
2042	18.988	2.784
2043	18.988	2.785
2044	18.985	2.787
2045	18.982	2.791
2046	18.984	2.787
2047	18.982	2.791
2048	18.976	2.787
2049	18.975	2.780
2050	18.984	2.783
2051	18.988	2.788
2052	18.989	2.784
2053	18.991	2.780
2054	18.995	2.781
2055	19.001	2.777
2056	19.002	2.775
2057	19.000	2.783

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	4.521	5.243	5.580	6.354	7.213	8.305	9.461	10.240	11.994
2009	5.509	6.559	7.111	8.435	9.994	12.149	14.778	16.705	21.748
2010	6.878	7.971	8.625	10.000	11.872	14.249	17.362	19.600	25.182
2011	8.052	9.302	10.102	11.605	13.545	15.897	18.759	20.920	26.127
2012	9.219	10.619	11.509	13.124	15.124	17.399	19.893	21.773	26.033
2013	10.236	11.819	12.775	14.454	16.529	18.814	21.174	22.876	26.833
2014	10.930	12.540	13.474	15.136	17.132	19.218	21.212	22.531	25.292
2015	11.531	13.192	14.113	15.797	17.762	19.789	21.639	22.790	24.911
2016	11.938	13.622	14.538	16.220	18.142	20.151	21.968	23.036	25.038
2017	12.204	13.890	14.830	16.490	18.417	20.386	22.152	23.197	25.120

2018	12.390	14.098	15.034	16.679	18.579	20.538	22.297	23.334	25.281
2019	12.520	14.221	15.172	16.802	18.698	20.663	22.400	23.438	25.327
2020	12.645	14.320	15.248	16.892	18.797	20.734	22.475	23.510	25.434
2021	12.716	14.384	15.314	16.949	18.852	20.788	22.548	23.572	25.464
2022	12.790	14.422	15.332	16.994	18.890	20.816	22.567	23.596	25.504
2023	12.849	14.443	15.372	17.031	18.926	20.858	22.605	23.633	25.539
2024	12.813	14.475	15.411	17.055	18.940	20.875	22.623	23.666	25.517
2025	12.817	14.491	15.422	17.066	18.941	20.879	22.630	23.646	25.559
2026	12.851	14.482	15.436	17.070	18.943	20.886	22.624	23.659	25.569
2027	12.860	14.501	15.453	17.073	18.961	20.875	22.643	23.670	25.669
2028	12.876	14.494	15.439	17.084	18.955	20.881	22.651	23.707	25.626
2029	12.802	14.506	15.414	17.057	18.961	20.875	22.645	23.660	25.632
2030	12.740	14.490	15.416	17.061	18.941	20.868	22.620	23.690	25.573
2031	12.792	14.445	15.405	17.052	18.929	20.877	22.618	23.681	25.610
2032	12.877	14.464	15.380	17.045	18.918	20.865	22.623	23.662	25.552
2033	12.876	14.461	15.382	17.024	18.920	20.852	22.612	23.656	25.523
2034	12.843	14.437	15.409	17.042	18.917	20.843	22.624	23.644	25.572
2035	12.811	14.448	15.415	17.051	18.910	20.865	22.632	23.643	25.546
2036	12.858	14.436	15.388	17.043	18.935	20.848	22.632	23.671	25.580
2037	12.813	14.426	15.383	17.035	18.935	20.849	22.615	23.645	25.512
2038	12.760	14.452	15.373	17.034	18.939	20.859	22.616	23.638	25.554
2039	12.760	14.452	15.377	17.039	18.938	20.867	22.608	23.651	25.557
2040	12.750	14.477	15.414	17.035	18.936	20.898	22.636	23.643	25.535
2041	12.749	14.464	15.413	17.070	18.941	20.885	22.616	23.669	25.503
2042	12.744	14.457	15.434	17.073	18.946	20.880	22.610	23.623	25.546
2043	12.779	14.463	15.417	17.053	18.932	20.869	22.606	23.636	25.581
2044	12.846	14.460	15.393	17.046	18.936	20.884	22.610	23.663	25.617
2045	12.831	14.463	15.374	17.042	18.947	20.874	22.611	23.649	25.585
2046	12.844	14.441	15.398	17.043	18.944	20.878	22.615	23.627	25.574
2047	12.803	14.438	15.395	17.052	18.940	20.874	22.602	23.671	25.518
2048	12.820	14.459	15.397	17.043	18.931	20.868	22.610	23.630	25.530
2049	12.812	14.457	15.400	17.045	18.929	20.852	22.579	23.617	25.552
2050	12.712	14.431	15.420	17.069	18.948	20.877	22.580	23.629	25.515
2051	12.734	14.426	15.394	17.069	18.940	20.886	22.611	23.607	25.523
2052	12.741	14.445	15.412	17.064	18.953	20.875	22.597	23.627	25.526
2053	12.785	14.437	15.415	17.086	18.962	20.857	22.615	23.644	25.530
2054	12.853	14.473	15.425	17.069	18.956	20.864	22.626	23.624	25.576
2055	12.835	14.500	15.449	17.067	18.950	20.894	22.607	23.635	25.581
2056	12.859	14.508	15.429	17.075	18.956	20.899	22.612	23.643	25.528
2057	12.834	14.468	15.423	17.073	18.953	20.900	22.638	23.663	25.471

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2008	11.485	3.375
2009	13.686	3.938
2010	16.035	4.207
2011	17.533	3.987
2012	18.897	3.767
2013	19.954	3.608
2014	20.458	3.347
2015	20.953	3.249
2016	21.288	3.200
2017	21.516	3.173
2018	21.673	3.159
2019	21.783	3.152
2020	21.858	3.151
2021	21.910	3.148
2022	21.949	3.144
2023	21.975	3.140
2024	21.989	3.138
2025	22.000	3.137
2026	22.005	3.137
2027	22.005	3.138
2028	22.000	3.140
2029	21.993	3.146
2030	21.984	3.148
2031	21.973	3.143
2032	21.965	3.139
2033	21.964	3.139
2034	21.969	3.141

2035	21.970	3.146
2036	21.971	3.143
2037	21.969	3.146
2038	21.973	3.151
2039	21.981	3.152
2040	21.987	3.145
2041	21.985	3.140
2042	21.986	3.140
2043	21.982	3.143
2044	21.979	3.145
2045	21.983	3.144
2046	21.977	3.147
2047	21.972	3.142
2048	21.973	3.135
2049	21.979	3.139
2050	21.985	3.143
2051	21.987	3.138
2052	21.988	3.136
2053	21.993	3.134
2054	21.999	3.130
2055	22.001	3.129
2056	22.000	3.136
2057	21.999	3.144

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	6.166	7.316	7.860	9.222	10.860	13.060	15.698	17.683	22.909
2009	7.598	8.791	9.499	10.982	12.986	15.496	18.795	21.045	26.901
2010	9.168	10.576	11.472	13.170	15.373	18.054	21.354	23.814	29.840
2011	10.448	12.016	13.003	14.804	17.028	19.634	22.546	24.765	29.855
2012	11.629	13.387	14.442	16.297	18.575	21.072	23.656	25.520	29.798
2013	12.624	14.460	15.537	17.442	19.735	22.177	24.578	26.199	29.790
2014	13.273	15.172	16.225	18.122	20.345	22.657	24.799	26.153	28.718
2015	13.841	15.763	16.786	18.690	20.860	23.142	25.204	26.427	28.713
2016	14.187	16.129	17.170	19.062	21.238	23.451	25.457	26.650	28.861
2017	14.443	16.386	17.457	19.306	21.456	23.667	25.653	26.815	29.043
2018	14.606	16.565	17.629	19.483	21.612	23.826	25.782	26.954	29.109
2019	14.763	16.701	17.757	19.597	21.730	23.922	25.881	27.046	29.185
2020	14.879	16.757	17.816	19.662	21.802	23.991	25.941	27.129	29.255
2021	14.952	16.823	17.853	19.734	21.858	24.042	26.008	27.185	29.286
2022	15.039	16.853	17.906	19.765	21.901	24.079	26.055	27.204	29.339
2023	15.008	16.886	17.947	19.801	21.922	24.101	26.068	27.240	29.304
2024	15.012	16.910	17.977	19.814	21.937	24.110	26.093	27.255	29.335
2025	15.035	16.900	17.985	19.823	21.943	24.134	26.083	27.243	29.434
2026	15.015	16.934	17.993	19.832	21.953	24.106	26.098	27.264	29.468
2027	15.066	16.912	17.986	19.844	21.946	24.128	26.107	27.305	29.453
2028	15.025	16.934	17.969	19.813	21.952	24.098	26.101	27.286	29.478
2029	14.945	16.908	17.964	19.822	21.943	24.110	26.074	27.279	29.440
2030	14.965	16.878	17.956	19.806	21.917	24.110	26.080	27.282	29.449
2031	15.074	16.889	17.929	19.798	21.908	24.089	26.085	27.253	29.421
2032	15.079	16.865	17.908	19.789	21.918	24.087	26.066	27.251	29.369
2033	15.027	16.864	17.946	19.797	21.912	24.071	26.087	27.237	29.382
2034	14.992	16.866	17.957	19.799	21.901	24.093	26.087	27.213	29.386
2035	15.062	16.854	17.937	19.785	21.921	24.083	26.097	27.274	29.413
2036	15.018	16.848	17.920	19.794	21.928	24.084	26.068	27.238	29.331
2037	14.961	16.880	17.923	19.775	21.936	24.090	26.061	27.242	29.376
2038	14.940	16.871	17.927	19.785	21.932	24.108	26.078	27.236	29.375
2039	14.918	16.888	17.952	19.786	21.935	24.135	26.081	27.234	29.365
2040	14.934	16.876	17.962	19.811	21.927	24.137	26.087	27.245	29.339
2041	14.932	16.884	17.979	19.819	21.938	24.110	26.055	27.215	29.370
2042	14.947	16.891	17.965	19.809	21.932	24.123	26.065	27.223	29.394
2043	15.028	16.878	17.934	19.790	21.933	24.125	26.074	27.229	29.448
2044	15.022	16.899	17.910	19.799	21.944	24.101	26.073	27.223	29.420
2045	15.026	16.862	17.943	19.802	21.947	24.114	26.086	27.213	29.409
2046	14.988	16.858	17.942	19.794	21.927	24.112	26.059	27.266	29.394
2047	14.997	16.877	17.928	19.795	21.923	24.112	26.075	27.224	29.362
2048	15.003	16.862	17.950	19.804	21.924	24.089	26.051	27.213	29.371
2049	14.900	16.851	17.948	19.821	21.933	24.115	26.035	27.202	29.353
2050	14.911	16.844	17.950	19.824	21.940	24.135	26.056	27.180	29.355
2051	14.927	16.867	17.941	19.828	21.945	24.119	26.049	27.201	29.362
2052	14.982	16.854	17.949	19.833	21.954	24.105	26.058	27.217	29.329

2053	15.045	16.885	17.964	19.825	21.950	24.102	26.075	27.220	29.380
2054	15.027	16.923	17.997	19.820	21.943	24.125	26.062	27.222	29.425
2055	15.047	16.940	17.979	19.834	21.952	24.130	26.072	27.218	29.375
2056	15.039	16.903	17.960	19.830	21.953	24.136	26.088	27.261	29.283
2057	15.032	16.896	17.957	19.810	21.951	24.134	26.104	27.281	29.335

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	AVG F_WT_B	STD
2008	0.090	0.024
2009	0.093	0.009
2010	0.136	0.015
2011	0.133	0.015
2012	0.138	0.013
2013	0.141	0.012
2014	0.143	0.012
2015	0.144	0.011
2016	0.145	0.011
2017	0.146	0.011
2018	0.146	0.011
2019	0.146	0.011
2020	0.146	0.011
2021	0.146	0.010
2022	0.147	0.010
2023	0.147	0.010
2024	0.147	0.010
2025	0.147	0.010
2026	0.147	0.010
2027	0.147	0.010
2028	0.147	0.010
2029	0.147	0.010
2030	0.147	0.010
2031	0.147	0.010
2032	0.147	0.010
2033	0.147	0.010
2034	0.147	0.010
2035	0.147	0.010
2036	0.147	0.010
2037	0.147	0.011
2038	0.147	0.010
2039	0.147	0.010
2040	0.147	0.010
2041	0.147	0.010
2042	0.147	0.010
2043	0.147	0.010
2044	0.147	0.010
2045	0.147	0.010
2046	0.147	0.010
2047	0.147	0.010
2048	0.147	0.010
2049	0.147	0.010
2050	0.147	0.010
2051	0.147	0.010
2052	0.147	0.010
2053	0.147	0.010
2054	0.147	0.010
2055	0.147	0.011
2056	0.147	0.010
2057	0.147	0.010

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.041	0.054	0.061	0.074	0.089	0.104	0.122	0.131	0.154
2009	0.076	0.080	0.082	0.087	0.093	0.099	0.105	0.108	0.114
2010	0.101	0.111	0.116	0.126	0.137	0.147	0.155	0.160	0.168
2011	0.101	0.110	0.114	0.123	0.133	0.143	0.152	0.157	0.166
2012	0.108	0.116	0.121	0.129	0.138	0.147	0.155	0.160	0.167
2013	0.113	0.121	0.125	0.133	0.142	0.150	0.157	0.161	0.168
2014	0.116	0.124	0.128	0.135	0.143	0.151	0.158	0.162	0.168
2015	0.118	0.126	0.130	0.137	0.144	0.152	0.159	0.162	0.168

2016	0.119	0.127	0.131	0.138	0.145	0.153	0.159	0.163	0.169
2017	0.121	0.128	0.132	0.138	0.146	0.153	0.160	0.163	0.169
2018	0.121	0.128	0.132	0.139	0.146	0.153	0.160	0.163	0.169
2019	0.122	0.129	0.132	0.139	0.146	0.154	0.160	0.164	0.169
2020	0.122	0.129	0.133	0.139	0.146	0.154	0.160	0.164	0.169
2021	0.122	0.129	0.133	0.139	0.146	0.154	0.160	0.164	0.169
2022	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2023	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2024	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2025	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2026	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2027	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2028	0.123	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2029	0.123	0.129	0.133	0.140	0.147	0.154	0.161	0.164	0.170
2030	0.123	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2031	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2032	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2033	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2034	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2035	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2036	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2037	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2038	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2039	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2040	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2041	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2042	0.122	0.130	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2043	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2044	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2045	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2046	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2047	0.122	0.130	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2048	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2049	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2050	0.123	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2051	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.170
2052	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2053	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2054	0.122	0.129	0.133	0.139	0.147	0.154	0.160	0.164	0.169
2055	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2056	0.122	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169
2057	0.123	0.129	0.133	0.140	0.147	0.154	0.160	0.164	0.169

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	9.671	2.301
2009	12.667	3.700
2010	15.038	4.109
2011	16.765	4.057
2012	18.283	3.837
2013	19.703	3.801
2014	20.190	3.400
2015	20.793	3.261
2016	21.197	3.193
2017	21.472	3.157
2018	21.658	3.138
2019	21.789	3.128
2020	21.879	3.123
2021	21.941	3.122
2022	21.986	3.119
2023	22.017	3.115
2024	22.038	3.111
2025	22.050	3.109
2026	22.058	3.108
2027	22.060	3.110
2028	22.058	3.111
2029	22.050	3.115
2030	22.043	3.118
2031	22.033	3.119
2032	22.023	3.114

2033	22.019	3.111
2034	22.020	3.113
2035	22.024	3.115
2036	22.024	3.116
2037	22.025	3.117
2038	22.025	3.121
2039	22.032	3.122
2040	22.037	3.121
2041	22.042	3.115
2042	22.040	3.112
2043	22.038	3.115
2044	22.036	3.115
2045	22.035	3.119
2046	22.033	3.117
2047	22.030	3.117
2048	22.027	3.112
2049	22.028	3.110
2050	22.037	3.112
2051	22.040	3.113
2052	22.041	3.110
2053	22.045	3.106
2054	22.051	3.104
2055	22.054	3.103
2056	22.055	3.104
2057	22.053	3.112

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	5.777	6.625	7.081	8.131	9.345	10.853	12.723	13.791	17.352
2009	6.912	8.078	8.724	10.141	12.011	14.377	17.414	19.536	25.229
2010	8.583	9.848	10.648	12.220	14.334	16.955	20.280	22.732	28.774
2011	9.906	11.357	12.282	13.999	16.171	18.779	21.871	24.209	29.801
2012	11.198	12.839	13.827	15.638	17.885	20.395	23.106	25.138	29.777
2013	12.319	14.118	15.185	17.075	19.390	21.909	24.515	26.368	30.651
2014	13.093	14.895	15.956	17.820	20.028	22.358	24.584	26.011	29.001
2015	13.720	15.600	16.640	18.507	20.709	22.966	25.037	26.315	28.678
2016	14.154	16.073	17.099	18.989	21.122	23.354	25.367	26.581	28.834
2017	14.469	16.374	17.427	19.284	21.406	23.620	25.581	26.761	28.950
2018	14.657	16.607	17.652	19.478	21.597	23.796	25.730	26.890	29.055
2019	14.804	16.746	17.781	19.627	21.730	23.923	25.852	27.044	29.170
2020	14.949	16.825	17.873	19.700	21.828	24.001	25.945	27.103	29.228
2021	15.035	16.886	17.927	19.783	21.887	24.054	26.009	27.164	29.266
2022	15.105	16.940	17.966	19.821	21.938	24.093	26.042	27.192	29.296
2023	15.136	16.958	18.012	19.854	21.967	24.133	26.076	27.244	29.342
2024	15.150	16.998	18.053	19.881	21.984	24.147	26.117	27.250	29.302
2025	15.126	17.005	18.074	19.902	21.991	24.152	26.104	27.258	29.406
2026	15.139	17.031	18.077	19.910	21.996	24.154	26.117	27.277	29.419
2027	15.166	17.002	18.085	19.911	21.994	24.141	26.125	27.300	29.488
2028	15.139	17.021	18.066	19.899	22.000	24.134	26.124	27.306	29.463
2029	15.076	17.007	18.063	19.893	22.010	24.145	26.120	27.260	29.434
2030	15.064	16.977	18.042	19.889	21.986	24.138	26.115	27.285	29.456
2031	15.126	16.967	18.044	19.881	21.970	24.137	26.094	27.253	29.461
2032	15.196	16.970	18.027	19.871	21.967	24.132	26.093	27.249	29.355
2033	15.158	16.971	18.019	19.848	21.972	24.120	26.104	27.229	29.378
2034	15.138	16.958	18.050	19.864	21.963	24.110	26.112	27.230	29.401
2035	15.127	16.956	18.044	19.874	21.962	24.127	26.090	27.255	29.382
2036	15.130	16.974	18.004	19.866	21.985	24.118	26.108	27.247	29.325
2037	15.140	16.955	18.015	19.860	21.990	24.122	26.089	27.239	29.333
2038	15.080	16.981	18.015	19.859	21.979	24.138	26.094	27.244	29.388
2039	15.052	16.994	18.033	19.858	21.991	24.154	26.087	27.252	29.370
2040	15.028	16.982	18.062	19.859	21.985	24.167	26.115	27.246	29.332
2041	15.025	16.985	18.069	19.890	21.982	24.151	26.108	27.236	29.352
2042	15.064	16.964	18.054	19.888	21.991	24.154	26.088	27.242	29.323
2043	15.088	16.989	18.042	19.871	21.979	24.149	26.073	27.234	29.398
2044	15.178	16.987	18.017	19.877	21.991	24.142	26.081	27.244	29.446
2045	15.113	16.992	18.010	19.872	21.986	24.144	26.103	27.223	29.373
2046	15.136	16.964	18.038	19.864	21.990	24.147	26.098	27.238	29.390
2047	15.130	16.949	18.023	19.872	21.980	24.139	26.104	27.259	29.381
2048	15.133	16.967	18.039	19.867	21.981	24.134	26.081	27.237	29.385
2049	15.031	16.954	18.041	19.876	21.983	24.139	26.061	27.228	29.368
2050	15.007	16.934	18.054	19.897	21.987	24.159	26.055	27.219	29.351

2051	15.053	16.947	18.023	19.903	21.984	24.150	26.061	27.218	29.365
2052	15.056	16.952	18.046	19.905	22.003	24.134	26.089	27.221	29.335
2053	15.117	16.977	18.043	19.912	22.021	24.141	26.077	27.227	29.347
2054	15.166	17.007	18.060	19.911	22.002	24.150	26.095	27.233	29.393
2055	15.154	17.031	18.073	19.903	22.004	24.161	26.086	27.238	29.419
2056	15.147	17.007	18.067	19.906	22.006	24.170	26.097	27.267	29.325
2057	15.137	17.013	18.046	19.896	22.001	24.178	26.118	27.273	29.296

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	9011.190	3913.470
2009	8999.454	3908.248
2010	9008.359	3907.526
2011	8966.766	3915.129
2012	8996.693	3897.183
2013	8974.402	3895.672
2014	8986.830	3892.117
2015	8993.359	3905.899
2016	9003.871	3905.593
2017	9007.199	3906.396
2018	9003.983	3913.302
2019	9000.856	3894.545
2020	9010.908	3910.963
2021	9021.219	3881.447
2022	8982.541	3915.711
2023	9012.755	3915.058
2024	9000.941	3902.601
2025	8995.526	3910.910
2026	8976.383	3891.976
2027	8981.426	3915.187
2028	8982.304	3894.246
2029	8960.280	3897.973
2030	8968.830	3887.088
2031	8979.682	3910.356
2032	9017.489	3912.509
2033	8974.980	3914.241
2034	8989.174	3897.882
2035	8966.338	3920.303
2036	8993.783	3897.266
2037	8994.474	3897.589
2038	9030.273	3898.233
2039	8961.421	3900.640
2040	8985.927	3899.085
2041	8995.159	3895.586
2042	8951.974	3885.026
2043	9023.166	3905.656
2044	8982.418	3905.486
2045	8956.726	3896.480
2046	8981.691	3889.803
2047	9016.579	3906.171
2048	8999.871	3890.829
2049	8988.763	3886.962
2050	8987.780	3883.601
2051	8993.680	3900.909
2052	9014.556	3912.519
2053	9001.006	3910.513
2054	8981.171	3897.318
2055	8998.747	3910.098
2056	8984.482	3896.678
2057	8990.147	3886.191

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	2794.009	3496.184	4069.326	5322.468	9858.841	12212.363	13744.049	16003.688	18020.434
2009	2785.465	3500.380	4088.035	5321.094	9855.641	12195.067	13701.315	15992.163	18005.176
2010	2792.039	3505.909	4085.143	5314.051	9858.026	12196.067	13654.052	15958.678	18036.222
2011	2792.605	3502.325	4061.625	5272.084	9843.721	12187.705	13627.338	15980.829	18066.199
2012	2806.660	3530.628	4091.538	5306.016	9852.268	12195.993	13602.538	15944.124	18049.796

2013	2792.597	3507.187	4065.846	5301.115	9849.087	12181.112	13548.488	15952.680	18017.002
2014	2792.987	3506.685	4105.457	5299.304	9854.143	12173.435	13584.611	15914.959	18001.344
2015	2804.099	3509.087	4089.275	5304.133	9855.379	12195.391	13723.210	15971.295	18015.539
2016	2803.535	3515.446	4073.732	5296.946	9857.799	12185.473	13621.937	16033.324	18063.333
2017	2787.513	3508.665	4074.767	5316.516	9862.089	12192.742	13681.849	15983.778	18049.672
2018	2789.439	3506.086	4082.233	5315.144	9857.046	12202.558	13656.525	16025.608	18043.823
2019	2804.398	3509.548	4080.522	5325.282	9857.269	12182.046	13591.408	16009.504	17996.660
2020	2814.378	3501.939	4080.947	5320.081	9857.836	12199.133	13634.840	16028.085	18051.994
2021	2795.211	3534.615	4111.104	5335.069	9863.471	12203.796	13554.952	15886.638	18026.009
2022	2791.919	3498.559	4078.718	5278.983	9853.619	12198.753	13703.837	15934.503	18041.717
2023	2781.624	3509.112	4091.465	5321.460	9860.622	12194.417	13706.433	16040.635	18055.551
2024	2795.214	3499.542	4068.847	5313.573	9857.937	12185.364	13656.091	15990.616	18051.731
2025	2794.631	3498.132	4061.229	5302.454	9851.510	12186.048	13725.628	15993.329	18042.938
2026	2791.213	3501.669	4086.872	5310.042	9852.814	12181.250	13616.149	15894.538	18017.431
2027	2801.884	3502.483	4064.668	5285.016	9852.435	12201.208	13704.457	15975.048	18023.615
2028	2791.776	3520.118	4077.884	5312.940	9851.387	12181.052	13659.419	15972.722	18004.441
2029	2789.147	3499.673	4041.346	5282.884	9850.599	12179.971	13555.893	15930.781	17995.773
2030	2790.617	3511.411	4078.089	5312.079	9844.605	12178.824	13509.669	15959.825	18011.895
2031	2784.166	3494.535	4067.400	5299.451	9853.117	12188.256	13668.359	15964.147	18047.668
2032	2807.836	3513.347	4080.840	5313.498	9863.006	12200.047	13724.752	16008.595	18084.527
2033	2771.743	3493.405	4048.802	5298.643	9848.055	12192.747	13658.099	15985.062	18041.979
2034	2794.671	3504.975	4075.341	5301.786	9853.296	12173.008	13639.363	15964.330	18051.896
2035	2790.678	3480.836	4014.838	5273.979	9845.619	12181.144	13637.226	16040.054	18019.924
2036	2778.892	3498.645	4092.334	5304.059	9855.662	12182.380	13613.441	15981.612	18043.384
2037	2792.934	3506.815	4091.510	5317.139	9857.115	12189.978	13611.186	15982.040	18005.602
2038	2793.158	3521.271	4094.413	5345.106	9867.865	12200.969	13716.200	15982.823	18049.681
2039	2794.649	3513.031	4070.665	5281.567	9844.768	12172.510	13580.963	15955.596	18011.710
2040	2800.220	3505.176	4076.545	5310.561	9849.211	12184.691	13666.192	15921.149	18042.379
2041	2773.413	3519.432	4097.909	5315.415	9854.804	12180.941	13540.688	16007.536	18022.664
2042	2784.981	3503.350	4067.332	5286.408	9850.907	12164.362	13453.966	15855.296	18013.946
2043	2801.702	3515.140	4094.662	5334.291	9861.882	12194.441	13709.023	16038.903	18080.285
2044	2795.632	3514.383	4087.659	5310.562	9848.284	12180.138	13592.622	16014.793	18053.330
2045	2788.853	3501.394	4055.957	5297.742	9843.639	12167.084	13526.661	15945.001	18044.462
2046	2788.175	3506.232	4055.898	5303.740	9855.555	12178.563	13518.132	15885.364	18033.698
2047	2803.753	3515.946	4106.503	5317.224	9860.624	12209.058	13735.913	15992.571	18016.474
2048	2794.737	3517.119	4058.943	5310.289	9859.040	12194.353	13580.539	15835.338	18010.293
2049	2792.072	3505.816	4098.132	5326.068	9856.388	12177.469	13618.774	15941.862	17996.579
2050	2801.833	3501.641	4064.932	5321.996	9854.921	12187.457	13545.400	15866.099	18011.707
2051	2801.823	3513.161	4077.579	5304.724	9856.676	12188.668	13644.696	15918.705	18039.414
2052	2800.005	3506.689	4088.932	5334.700	9855.436	12215.005	13734.908	15996.554	18041.366
2053	2804.551	3519.457	4089.130	5308.754	9854.975	12194.530	13686.664	16033.884	18051.860
2054	2777.676	3498.233	4073.332	5300.833	9849.685	12184.554	13588.148	15934.252	17980.253
2055	2782.931	3513.211	4078.061	5311.562	9848.077	12199.172	13707.269	15988.204	18035.289
2056	2786.538	3509.773	4077.883	5322.414	9850.129	12183.341	13578.281	15946.642	18027.788
2057	2783.982	3509.874	4095.966	5306.047	9854.681	12188.865	13543.918	15912.585	18002.711

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	0.963	0.000
2009	1.265	0.328
2010	2.212	0.756
2011	2.353	0.691
2012	2.620	0.643
2013	2.828	0.607
2014	2.926	0.546
2015	3.023	0.524
2016	3.088	0.513
2017	3.132	0.508
2018	3.161	0.504
2019	3.182	0.502
2020	3.197	0.501
2021	3.207	0.501
2022	3.214	0.501
2023	3.219	0.501
2024	3.223	0.500
2025	3.225	0.499
2026	3.226	0.499
2027	3.227	0.500
2028	3.227	0.500
2029	3.226	0.500
2030	3.225	0.500

2031	3.223	0.502
2032	3.222	0.501
2033	3.220	0.500
2034	3.219	0.499
2035	3.220	0.500
2036	3.222	0.500
2037	3.222	0.501
2038	3.222	0.500
2039	3.221	0.501
2040	3.222	0.502
2041	3.223	0.501
2042	3.225	0.500
2043	3.223	0.499
2044	3.223	0.500
2045	3.223	0.500
2046	3.222	0.501
2047	3.223	0.500
2048	3.222	0.501
2049	3.221	0.500
2050	3.222	0.498
2051	3.223	0.500
2052	3.224	0.500
2053	3.224	0.499
2054	3.224	0.499
2055	3.225	0.499
2056	3.226	0.499
2057	3.226	0.499

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
2009	0.697	0.828	0.895	1.037	1.213	1.436	1.711	1.869	2.253
2010	1.101	1.303	1.433	1.700	2.052	2.549	3.184	3.660	4.743
2011	1.296	1.498	1.625	1.878	2.224	2.670	3.235	3.654	4.672
2012	1.502	1.732	1.890	2.178	2.543	2.955	3.429	3.783	4.627
2013	1.672	1.939	2.104	2.405	2.775	3.180	3.596	3.902	4.586
2014	1.802	2.078	2.245	2.544	2.900	3.275	3.630	3.864	4.330
2015	1.906	2.189	2.353	2.653	3.007	3.372	3.705	3.910	4.288
2016	1.971	2.266	2.431	2.729	3.077	3.437	3.764	3.955	4.304
2017	2.019	2.315	2.478	2.774	3.120	3.476	3.797	3.988	4.328
2018	2.058	2.348	2.514	2.808	3.152	3.504	3.822	4.011	4.348
2019	2.078	2.373	2.538	2.831	3.172	3.525	3.840	4.024	4.363
2020	2.094	2.387	2.549	2.846	3.187	3.535	3.849	4.035	4.370
2021	2.111	2.398	2.563	2.856	3.199	3.548	3.860	4.046	4.384
2022	2.117	2.402	2.568	2.863	3.205	3.555	3.870	4.052	4.394
2023	2.128	2.409	2.572	2.869	3.214	3.559	3.873	4.059	4.399
2024	2.132	2.414	2.577	2.872	3.215	3.561	3.876	4.066	4.399
2025	2.133	2.418	2.581	2.877	3.216	3.564	3.883	4.062	4.389
2026	2.135	2.416	2.585	2.878	3.215	3.565	3.880	4.060	4.406
2027	2.132	2.418	2.588	2.876	3.219	3.563	3.881	4.064	4.415
2028	2.137	2.419	2.584	2.880	3.217	3.565	3.881	4.068	4.416
2029	2.134	2.419	2.582	2.875	3.217	3.565	3.882	4.069	4.407
2030	2.126	2.417	2.582	2.876	3.219	3.562	3.878	4.064	4.407
2031	2.119	2.414	2.578	2.874	3.214	3.564	3.878	4.067	4.413
2032	2.132	2.410	2.579	2.871	3.209	3.565	3.879	4.066	4.397
2033	2.139	2.412	2.577	2.868	3.209	3.562	3.876	4.060	4.389
2034	2.129	2.411	2.576	2.871	3.208	3.557	3.874	4.061	4.396
2035	2.122	2.408	2.580	2.873	3.208	3.559	3.876	4.060	4.403
2036	2.126	2.408	2.580	2.873	3.212	3.561	3.876	4.062	4.402
2037	2.133	2.410	2.573	2.870	3.213	3.563	3.877	4.066	4.394
2038	2.122	2.410	2.574	2.872	3.215	3.561	3.878	4.062	4.395
2039	2.120	2.413	2.575	2.870	3.214	3.561	3.874	4.062	4.398
2040	2.114	2.412	2.577	2.871	3.214	3.565	3.876	4.063	4.401
2041	2.111	2.413	2.582	2.873	3.212	3.566	3.879	4.063	4.394
2042	2.116	2.411	2.582	2.878	3.217	3.566	3.877	4.062	4.405
2043	2.119	2.411	2.583	2.875	3.212	3.564	3.873	4.060	4.407
2044	2.129	2.415	2.581	2.873	3.212	3.564	3.873	4.063	4.401
2045	2.133	2.414	2.576	2.871	3.215	3.563	3.878	4.060	4.411
2046	2.127	2.410	2.576	2.871	3.213	3.562	3.877	4.057	4.401
2047	2.129	2.408	2.578	2.874	3.216	3.565	3.877	4.057	4.391
2048	2.130	2.409	2.573	2.874	3.213	3.563	3.878	4.061	4.387

2049	2.128	2.412	2.580	2.869	3.211	3.560	3.872	4.059	4.400
2050	2.116	2.409	2.581	2.877	3.214	3.561	3.868	4.055	4.395
2051	2.111	2.409	2.579	2.878	3.215	3.565	3.872	4.057	4.397
2052	2.124	2.408	2.578	2.875	3.216	3.564	3.875	4.062	4.396
2053	2.124	2.410	2.580	2.879	3.217	3.562	3.877	4.059	4.398
2054	2.134	2.410	2.581	2.878	3.219	3.562	3.879	4.061	4.395
2055	2.126	2.418	2.589	2.873	3.215	3.565	3.878	4.061	4.405
2056	2.133	2.420	2.583	2.878	3.217	3.566	3.876	4.059	4.406
2057	2.133	2.417	2.583	2.879	3.219	3.567	3.881	4.067	4.383

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	3771.	4163.	4325.	4727.	5155.	5617.	6033.	6406.	6868.
2	2204.	3664.	4493.	6779.	9954.	14869.	21106.	26688.	38727.
3	1416.	1789.	2126.	2757.	3713.	4918.	6413.	7619.	9754.
4	463.	619.	727.	922.	1225.	1628.	2094.	2451.	3132.
5	619.	798.	930.	1160.	1431.	1792.	2164.	2406.	2829.
6	243.	310.	352.	441.	563.	707.	849.	967.	1258.
7+	341.	401.	439.	507.	584.	668.	760.	819.	931.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	2787.	3510.	4078.	5322.	9850.	12183.	13578.	15947.	18028.
2	2278.	2876.	3338.	4348.	8061.	9986.	11220.	13087.	14763.
3	1826.	2299.	2677.	3484.	6474.	8008.	8931.	10473.	11817.
4	1388.	1742.	2023.	2627.	4877.	6034.	6773.	7934.	8933.
5	933.	1169.	1363.	1778.	3285.	4072.	4579.	5333.	6014.
6	629.	789.	916.	1191.	2214.	2737.	3064.	3575.	4051.
7+	2494.	2874.	3132.	3600.	4156.	4723.	5215.	5494.	6020.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.182	0.036
2009	0.155	0.000
2010	0.195	0.000
2011	0.195	0.000
2012	0.195	0.000
2013	0.195	0.000
2014	0.195	0.000
2015	0.195	0.000
2016	0.195	0.000
2017	0.195	0.000
2018	0.195	0.000
2019	0.195	0.000
2020	0.195	0.000
2021	0.195	0.000
2022	0.195	0.000
2023	0.195	0.000
2024	0.195	0.000
2025	0.195	0.000
2026	0.195	0.000
2027	0.195	0.000
2028	0.195	0.000
2029	0.195	0.000
2030	0.195	0.000
2031	0.195	0.000
2032	0.195	0.000
2033	0.195	0.000
2034	0.195	0.000
2035	0.195	0.000
2036	0.195	0.000
2037	0.195	0.000
2038	0.195	0.000
2039	0.195	0.000
2040	0.195	0.000
2041	0.195	0.000
2042	0.195	0.000
2043	0.195	0.000
2044	0.195	0.000
2045	0.195	0.000
2046	0.195	0.000

2047	0.195	0.000
2048	0.195	0.000
2049	0.195	0.000
2050	0.195	0.000
2051	0.195	0.000
2052	0.195	0.000
2053	0.195	0.000
2054	0.195	0.000
2055	0.195	0.000
2056	0.195	0.000
2057	0.195	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.113	0.130	0.139	0.157	0.178	0.201	0.228	0.245	0.286
2009	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155
2010	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2011	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2012	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2013	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2014	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2015	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2016	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2017	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2018	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2019	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2020	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2021	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2022	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2023	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2024	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2025	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2026	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2027	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2028	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2029	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2030	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2031	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2032	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2033	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2034	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2035	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2036	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2037	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2038	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2039	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2040	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2041	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2042	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2043	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2044	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2045	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2046	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2047	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2048	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2049	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2050	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2051	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2052	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2053	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2054	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2055	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2056	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2057	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195

SNE/MA Winter flounder

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AGEPRO VERSION 3.1

 PROJECTION RUN:
 SNEWIN GARM3 SPLIT Projected Frebuild

 INPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\JSNEWIN\J_SNEWIM_NEWEST08CAT_F=099.IN



 OUTPUT FILE:
 C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\JSNEWIN\J_SNEWIM_NEWEST08CAT_F=099.OUT



 RECRUITMENT MODEL:           15
 NUMBER OF BOOTSTRAP REALIZATIONS:         1000
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:          100
 TOTAL NUMBER OF SIMULATIONS:       100000
 NUMBER OF FEASIBLE SIMULATIONS:       100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:    1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             1.432
 2009  0.124
 2010  0.099
 2011  0.099
 2012  0.099
 2013  0.099
 2014  0.099
 2015  0.099
 2016  0.099
 2017  0.099
 2018  0.099
 2019  0.099
 2020  0.099
 2021  0.099
 2022  0.099
 2023  0.099
 2024  0.099
 2025  0.099
 2026  0.099
 2027  0.099
 2028  0.099
 2029  0.099
 2030  0.099
 2031  0.099
 2032  0.099
 2033  0.099
 2034  0.099
 2035  0.099
 2036  0.099
 2037  0.099
 2038  0.099
 2039  0.099
 2040  0.099
 2041  0.099
 2042  0.099
 2043  0.099
 2044  0.099
 2045  0.099
 2046  0.099
 2047  0.099
 2048  0.099
 2049  0.099
 2050  0.099
 2051  0.099
 2052  0.099
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2053	0.099
2054	0.099
2055	0.099
2056	0.099
2057	0.099

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2008	4.108	0.523
2009	4.458	0.617
2010	6.148	1.144
2011	8.591	1.854
2012	10.973	2.288
2013	15.281	3.888
2014	22.452	5.518
2015	30.233	5.951
2016	37.400	6.102
2017	44.102	6.351
2018	49.667	6.176
2019	53.831	6.029
2020	56.917	5.941
2021	59.214	5.896
2022	60.912	5.874
2023	62.171	5.855
2024	63.114	5.851
2025	63.813	5.855
2026	64.325	5.853
2027	64.709	5.855
2028	64.992	5.854
2029	65.195	5.854
2030	65.346	5.862
2031	65.462	5.873
2032	65.541	5.870
2033	65.590	5.851
2034	65.626	5.842
2035	65.655	5.835
2036	65.668	5.834
2037	65.678	5.830
2038	65.686	5.823
2039	65.691	5.824
2040	65.698	5.834
2041	65.712	5.838
2042	65.718	5.835
2043	65.724	5.840
2044	65.733	5.846
2045	65.730	5.849
2046	65.733	5.843
2047	65.736	5.842
2048	65.735	5.840
2049	65.733	5.837
2050	65.742	5.831
2051	65.741	5.832
2052	65.736	5.831
2053	65.731	5.827
2054	65.733	5.826
2055	65.740	5.825
2056	65.750	5.819
2057	65.756	5.821

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	2.950	3.258	3.475	3.757	4.086	4.437	4.786	4.973	5.429
2009	3.090	3.468	3.698	4.031	4.418	4.872	5.279	5.526	5.994
2010	4.125	4.570	4.813	5.325	5.989	6.768	7.612	8.225	9.447
2011	5.408	6.115	6.512	7.304	8.298	9.531	11.080	12.141	14.224
2012	6.810	7.776	8.369	9.428	10.708	12.165	13.848	15.184	17.947
2013	8.244	9.582	10.425	12.218	15.143	17.886	20.240	21.697	25.567
2014	11.265	14.116	15.440	18.026	22.500	26.307	29.702	31.603	35.383
2015	16.786	21.013	22.642	25.952	30.143	34.271	37.996	40.184	44.240
2016	24.056	27.819	29.606	33.146	37.215	41.458	45.393	47.720	52.171
2017	30.582	34.025	35.989	39.651	43.899	48.345	52.444	54.918	59.508

2018	36.508	39.981	41.877	45.340	49.441	53.755	57.783	60.221	64.798
2019	41.277	44.390	46.234	49.545	53.564	57.806	61.783	64.268	68.767
2020	44.703	47.672	49.464	52.670	56.600	60.821	64.818	67.232	71.670
2021	47.218	50.037	51.818	54.977	58.915	63.094	67.035	69.446	73.937
2022	48.990	51.827	53.511	56.692	60.586	64.781	68.726	71.084	75.645
2023	50.327	53.098	54.812	57.973	61.846	66.008	69.931	72.370	76.802
2024	51.261	54.065	55.740	58.927	62.795	66.943	70.886	73.285	77.789
2025	51.963	54.752	56.444	59.619	63.475	67.674	71.631	73.973	78.468
2026	52.501	55.272	56.946	60.122	63.988	68.186	72.116	74.526	78.912
2027	52.819	55.652	57.334	60.496	64.392	68.551	72.525	74.935	79.335
2028	53.140	55.944	57.645	60.784	64.663	68.837	72.797	75.197	79.662
2029	53.337	56.140	57.829	60.988	64.872	69.060	72.999	75.398	79.908
2030	53.475	56.305	57.970	61.111	65.066	69.194	73.122	75.536	80.035
2031	53.552	56.396	58.109	61.239	65.146	69.324	73.255	75.692	80.251
2032	53.696	56.477	58.172	61.330	65.213	69.396	73.356	75.729	80.414
2033	53.773	56.542	58.212	61.402	65.245	69.451	73.393	75.765	80.312
2034	53.889	56.591	58.250	61.434	65.287	69.495	73.396	75.808	80.261
2035	53.868	56.614	58.311	61.470	65.320	69.512	73.434	75.804	80.253
2036	53.886	56.636	58.329	61.476	65.321	69.526	73.427	75.853	80.243
2037	53.936	56.684	58.321	61.481	65.350	69.523	73.429	75.858	80.258
2038	53.904	56.678	58.357	61.484	65.374	69.491	73.426	75.866	80.209
2039	53.868	56.673	58.360	61.491	65.378	69.519	73.424	75.812	80.285
2040	53.858	56.663	58.378	61.512	65.389	69.555	73.444	75.839	80.275
2041	53.803	56.690	58.368	61.520	65.395	69.576	73.500	75.859	80.340
2042	53.889	56.652	58.375	61.543	65.387	69.577	73.477	75.862	80.343
2043	53.894	56.691	58.381	61.527	65.393	69.603	73.492	75.862	80.382
2044	53.888	56.675	58.388	61.532	65.406	69.595	73.500	75.886	80.418
2045	53.846	56.692	58.404	61.513	65.406	69.569	73.534	75.876	80.484
2046	53.838	56.716	58.388	61.543	65.415	69.587	73.493	75.908	80.387
2047	53.889	56.692	58.382	61.545	65.418	69.584	73.526	75.894	80.349
2048	53.903	56.670	58.383	61.549	65.421	69.550	73.547	75.907	80.282
2049	53.937	56.657	58.381	61.548	65.410	69.566	73.497	75.900	80.427
2050	53.883	56.669	58.401	61.570	65.450	69.572	73.475	75.846	80.376
2051	53.856	56.690	58.379	61.555	65.434	69.596	73.460	75.812	80.291
2052	53.897	56.662	58.384	61.542	65.435	69.607	73.507	75.819	80.251
2053	53.859	56.661	58.388	61.565	65.401	69.587	73.471	75.847	80.227
2054	53.880	56.675	58.393	61.557	65.407	69.578	73.490	75.808	80.319
2055	53.976	56.748	58.397	61.558	65.417	69.597	73.450	75.871	80.336
2056	54.004	56.793	58.436	61.553	65.405	69.591	73.491	75.892	80.312
2057	53.999	56.731	58.418	61.577	65.435	69.588	73.514	75.874	80.278

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2008	6.937	0.980
2009	9.153	1.957
2010	12.003	2.405
2011	16.284	3.739
2012	23.748	5.913
2013	32.621	6.647
2014	41.375	7.055
2015	49.486	7.264
2016	56.778	7.350
2017	63.193	7.385
2018	68.313	7.234
2019	72.137	7.128
2020	74.971	7.074
2021	77.070	7.040
2022	78.638	7.024
2023	79.803	7.022
2024	80.661	7.022
2025	81.299	7.019
2026	81.770	7.017
2027	82.118	7.016
2028	82.371	7.023
2029	82.562	7.036
2030	82.701	7.037
2031	82.791	7.022
2032	82.856	7.006
2033	82.904	7.001
2034	82.937	6.996

2035	82.955	6.993
2036	82.969	6.982
2037	82.978	6.981
2038	82.988	6.989
2039	83.002	6.996
2040	83.013	6.994
2041	83.019	6.995
2042	83.030	7.006
2043	83.032	7.008
2044	83.033	7.007
2045	83.042	7.005
2046	83.038	7.004
2047	83.040	7.003
2048	83.045	6.995
2049	83.047	6.991
2050	83.044	6.992
2051	83.038	6.987
2052	83.036	6.982
2053	83.044	6.980
2054	83.056	6.975
2055	83.062	6.971
2056	83.066	6.985
2057	83.066	7.003

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	5.023	5.504	5.762	6.223	6.855	7.526	8.173	8.606	9.607
2009	5.933	6.571	6.991	7.788	8.845	10.121	11.817	12.891	15.064
2010	7.616	8.609	9.224	10.366	11.717	13.282	15.096	16.447	19.191
2011	9.414	10.848	11.753	13.528	16.022	18.628	20.916	22.533	27.041
2012	12.444	14.938	16.249	18.830	23.893	27.871	31.550	33.528	37.602
2013	17.581	22.422	24.166	27.701	32.593	37.160	41.251	43.652	48.198
2014	25.796	30.314	32.295	36.405	41.212	46.143	50.604	53.287	58.174
2015	33.774	37.982	40.219	44.423	49.259	54.323	58.990	61.814	67.006
2016	40.986	45.142	47.436	51.639	56.533	61.657	66.413	69.285	74.777
2017	47.491	51.513	53.848	58.017	62.933	68.085	72.886	75.857	81.215
2018	53.038	56.950	59.194	63.203	68.008	73.091	77.878	80.771	86.105
2019	57.296	60.975	63.162	67.068	71.819	76.834	81.557	84.471	89.757
2020	60.401	63.937	66.085	69.920	74.630	79.647	84.329	87.162	92.626
2021	62.604	66.119	68.193	72.063	76.719	81.707	86.393	89.254	94.623
2022	64.253	67.718	69.771	73.638	78.281	83.240	87.965	90.783	96.137
2023	65.349	68.866	70.945	74.808	79.423	84.415	89.165	91.980	97.305
2024	66.283	69.735	71.783	75.667	80.274	85.308	90.016	92.818	98.054
2025	66.881	70.397	72.471	76.270	80.939	85.922	90.629	93.504	98.732
2026	67.385	70.865	72.956	76.748	81.405	86.378	91.096	93.970	99.279
2027	67.727	71.180	73.299	77.096	81.759	86.746	91.438	94.285	99.670
2028	67.978	71.487	73.521	77.352	82.037	86.964	91.671	94.559	99.920
2029	68.126	71.641	73.706	77.512	82.211	87.175	91.870	94.770	100.125
2030	68.278	71.766	73.874	77.683	82.332	87.317	91.999	94.915	100.336
2031	68.462	71.886	73.935	77.783	82.430	87.391	92.131	94.963	100.457
2032	68.546	71.960	74.010	77.856	82.473	87.476	92.160	94.999	100.428
2033	68.612	71.999	74.095	77.904	82.521	87.560	92.186	95.055	100.456
2034	68.643	72.056	74.144	77.932	82.547	87.558	92.234	95.067	100.341
2035	68.666	72.098	74.152	77.942	82.571	87.575	92.235	95.099	100.529
2036	68.610	72.123	74.156	77.965	82.615	87.584	92.261	95.078	100.290
2037	68.680	72.114	74.191	77.984	82.649	87.533	92.226	95.105	100.324
2038	68.634	72.126	74.205	77.986	82.654	87.589	92.243	95.107	100.394
2039	68.568	72.132	74.209	77.997	82.649	87.611	92.259	95.122	100.455
2040	68.661	72.127	74.202	78.043	82.628	87.633	92.302	95.145	100.478
2041	68.662	72.096	74.205	78.041	82.648	87.644	92.294	95.091	100.469
2042	68.634	72.115	74.220	78.020	82.660	87.655	92.285	95.100	100.586
2043	68.644	72.127	74.239	78.020	82.682	87.641	92.325	95.127	100.640
2044	68.637	72.152	74.243	78.022	82.674	87.654	92.328	95.190	100.482
2045	68.619	72.167	74.230	78.039	82.659	87.666	92.357	95.177	100.529
2046	68.678	72.107	74.222	78.054	82.687	87.628	92.355	95.213	100.444
2047	68.705	72.086	74.235	78.046	82.682	87.630	92.353	95.199	100.537
2048	68.713	72.130	74.228	78.078	82.688	87.642	92.324	95.135	100.540
2049	68.615	72.111	74.218	78.088	82.716	87.682	92.273	95.120	100.449
2050	68.643	72.093	74.225	78.056	82.705	87.699	92.302	95.085	100.350
2051	68.639	72.108	74.205	78.064	82.698	87.659	92.315	95.063	100.339
2052	68.675	72.112	74.227	78.082	82.669	87.665	92.276	95.100	100.397

2053	68.726	72.168	74.235	78.073	82.701	87.666	92.285	95.124	100.505
2054	68.802	72.253	74.269	78.060	82.678	87.656	92.288	95.163	100.491
2055	68.816	72.232	74.276	78.082	82.688	87.662	92.312	95.184	100.340
2056	68.733	72.149	74.240	78.087	82.752	87.666	92.332	95.162	100.471
2057	68.744	72.153	74.227	78.049	82.717	87.680	92.363	95.231	100.491

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 7

YEAR	AVG F_WT_B	STD
2008	0.210	0.029
2009	0.070	0.010
2010	0.057	0.005
2011	0.058	0.006
2012	0.052	0.006
2013	0.053	0.005
2014	0.059	0.006
2015	0.065	0.005
2016	0.070	0.004
2017	0.073	0.004
2018	0.075	0.003
2019	0.076	0.003
2020	0.077	0.003
2021	0.078	0.003
2022	0.078	0.003
2023	0.078	0.003
2024	0.079	0.003
2025	0.079	0.003
2026	0.079	0.003
2027	0.079	0.003
2028	0.079	0.003
2029	0.079	0.003
2030	0.079	0.003
2031	0.079	0.003
2032	0.079	0.003
2033	0.079	0.003
2034	0.079	0.003
2035	0.079	0.003
2036	0.079	0.003
2037	0.079	0.003
2038	0.079	0.003
2039	0.079	0.003
2040	0.079	0.003
2041	0.079	0.003
2042	0.079	0.003
2043	0.079	0.003
2044	0.079	0.003
2045	0.079	0.003
2046	0.079	0.003
2047	0.079	0.003
2048	0.079	0.003
2049	0.079	0.003
2050	0.079	0.003
2051	0.079	0.003
2052	0.079	0.003
2053	0.079	0.003
2054	0.079	0.003
2055	0.079	0.003
2056	0.079	0.003
2057	0.079	0.003

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO
7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.149	0.166	0.175	0.190	0.209	0.230	0.249	0.260	0.285
2009	0.048	0.053	0.057	0.064	0.071	0.077	0.083	0.086	0.092
2010	0.046	0.049	0.051	0.053	0.057	0.061	0.065	0.067	0.071
2011	0.044	0.048	0.050	0.054	0.057	0.061	0.065	0.067	0.071
2012	0.039	0.042	0.044	0.048	0.052	0.057	0.061	0.063	0.067
2013	0.040	0.044	0.046	0.049	0.053	0.056	0.059	0.061	0.064
2014	0.045	0.049	0.051	0.055	0.059	0.064	0.067	0.068	0.071
2015	0.052	0.056	0.059	0.062	0.066	0.069	0.072	0.073	0.075

2016	0.059	0.062	0.064	0.067	0.070	0.073	0.075	0.076	0.078
2017	0.063	0.066	0.068	0.070	0.073	0.076	0.078	0.079	0.080
2018	0.066	0.069	0.070	0.073	0.075	0.077	0.079	0.080	0.082
2019	0.068	0.070	0.072	0.074	0.076	0.078	0.080	0.081	0.082
2020	0.069	0.071	0.073	0.075	0.077	0.079	0.081	0.082	0.083
2021	0.070	0.072	0.073	0.076	0.078	0.080	0.081	0.082	0.083
2022	0.071	0.073	0.074	0.076	0.078	0.080	0.082	0.082	0.084
2023	0.071	0.073	0.074	0.076	0.079	0.080	0.082	0.083	0.084
2024	0.072	0.073	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2025	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2026	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2027	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2028	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2029	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2030	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2031	0.072	0.074	0.075	0.077	0.079	0.081	0.082	0.083	0.084
2032	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2033	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2034	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2035	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2036	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2037	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2038	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2039	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2040	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2041	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2042	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2043	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2044	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2045	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2046	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2047	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2048	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2049	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2050	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2051	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2052	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2053	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2054	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2055	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2056	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084
2057	0.072	0.074	0.075	0.077	0.079	0.081	0.083	0.083	0.084

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	6.728	0.778
2009	7.854	1.391
2010	10.643	2.146
2011	14.485	3.126
2012	20.270	4.648
2013	28.298	6.181
2014	37.319	6.871
2015	45.764	7.078
2016	53.384	7.208
2017	60.510	7.440
2018	66.419	7.267
2019	70.841	7.126
2020	74.117	7.048
2021	76.550	7.007
2022	78.358	6.984
2023	79.702	6.974
2024	80.700	6.973
2025	81.437	6.973
2026	81.982	6.968
2027	82.386	6.968
2028	82.683	6.973
2029	82.901	6.981
2030	83.063	6.988
2031	83.176	6.982
2032	83.253	6.967

2033	83.307	6.955
2034	83.347	6.951
2035	83.373	6.947
2036	83.386	6.939
2037	83.398	6.934
2038	83.408	6.937
2039	83.421	6.944
2040	83.431	6.947
2041	83.442	6.946
2042	83.449	6.951
2043	83.455	6.959
2044	83.459	6.960
2045	83.462	6.960
2046	83.464	6.956
2047	83.464	6.957
2048	83.467	6.951
2049	83.468	6.945
2050	83.472	6.943
2051	83.464	6.941
2052	83.462	6.935
2053	83.465	6.932
2054	83.475	6.929
2055	83.483	6.925
2056	83.489	6.929
2057	83.490	6.947

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	5.109	5.538	5.771	6.182	6.659	7.224	7.752	8.038	8.784
2009	5.377	5.918	6.258	6.883	7.679	8.603	9.680	10.463	11.929
2010	6.911	7.742	8.237	9.159	10.317	11.741	13.508	14.781	17.078
2011	8.729	9.931	10.694	12.214	14.219	16.413	18.453	19.946	23.264
2012	11.282	13.348	14.458	16.636	20.202	23.418	26.193	27.886	32.205
2013	15.482	18.898	20.430	23.441	28.325	32.599	36.370	38.533	42.777
2014	21.923	26.614	28.506	32.344	37.241	42.006	46.276	48.809	53.422
2015	30.168	34.616	36.700	40.822	45.599	50.478	55.012	57.684	62.692
2016	37.822	41.951	44.234	48.370	53.142	58.161	62.827	65.654	70.973
2017	44.605	48.695	51.053	55.298	60.262	65.456	70.280	73.169	78.680
2018	50.931	54.940	57.238	61.309	66.158	71.218	75.951	78.927	84.256
2019	55.877	59.682	61.870	65.792	70.531	75.534	80.244	83.135	88.376
2020	59.536	63.080	65.271	69.081	73.785	78.783	83.441	86.274	91.634
2021	62.132	65.634	67.726	71.554	76.205	81.163	85.815	88.615	93.992
2022	64.016	67.510	69.552	73.383	77.990	82.937	87.603	90.460	95.733
2023	65.319	68.844	70.901	74.746	79.355	84.280	88.945	91.781	97.080
2024	66.415	69.854	71.898	75.738	80.337	85.311	89.981	92.778	98.085
2025	67.112	70.602	72.649	76.483	81.057	86.037	90.719	93.517	98.765
2026	67.675	71.155	73.222	76.991	81.616	86.557	91.223	94.065	99.354
2027	68.064	71.517	73.636	77.407	82.036	86.965	91.650	94.479	99.753
2028	68.352	71.840	73.901	77.693	82.329	87.246	91.944	94.798	100.128
2029	68.544	72.058	74.112	77.911	82.563	87.475	92.130	95.013	100.315
2030	68.681	72.187	74.294	78.064	82.704	87.653	92.296	95.234	100.528
2031	68.866	72.324	74.393	78.192	82.819	87.754	92.404	95.305	100.778
2032	68.982	72.415	74.460	78.285	82.882	87.813	92.520	95.345	100.676
2033	69.098	72.474	74.543	78.342	82.944	87.915	92.548	95.392	100.707
2034	69.144	72.503	74.628	78.389	82.980	87.950	92.572	95.371	100.706
2035	69.176	72.539	74.633	78.397	82.994	87.968	92.583	95.447	100.713
2036	69.152	72.617	74.649	78.416	83.017	87.972	92.578	95.424	100.658
2037	69.184	72.619	74.681	78.424	83.067	87.946	92.586	95.425	100.610
2038	69.140	72.614	74.685	78.456	83.069	87.960	92.584	95.456	100.690
2039	69.093	72.600	74.704	78.466	83.098	87.994	92.604	95.479	100.623
2040	69.132	72.620	74.695	78.463	83.056	88.029	92.672	95.471	100.735
2041	69.177	72.606	74.698	78.500	83.060	88.021	92.685	95.472	100.776
2042	69.173	72.625	74.691	78.492	83.091	88.076	92.652	95.418	100.827
2043	69.145	72.633	74.716	78.481	83.092	88.033	92.676	95.489	100.883
2044	69.151	72.628	74.724	78.467	83.116	88.029	92.707	95.470	100.892
2045	69.090	72.684	74.717	78.497	83.111	88.058	92.678	95.492	100.795
2046	69.133	72.638	74.708	78.488	83.100	88.038	92.704	95.541	100.776
2047	69.182	72.618	74.710	78.524	83.106	88.039	92.723	95.545	100.682
2048	69.211	72.601	74.704	78.520	83.114	88.030	92.722	95.466	100.830
2049	69.170	72.602	74.699	78.541	83.128	88.027	92.630	95.464	100.834
2050	69.202	72.604	74.699	78.535	83.153	88.077	92.659	95.400	100.715

2051	69.162	72.603	74.692	78.516	83.127	88.084	92.666	95.394	100.645
2052	69.138	72.612	74.703	78.534	83.112	88.065	92.677	95.424	100.616
2053	69.247	72.622	74.720	78.532	83.100	88.041	92.657	95.421	100.797
2054	69.290	72.732	74.751	78.524	83.116	88.054	92.619	95.460	100.742
2055	69.311	72.724	74.762	78.514	83.126	88.047	92.645	95.483	100.754
2056	69.289	72.688	74.740	78.539	83.145	88.061	92.686	95.480	100.696
2057	69.266	72.653	74.693	78.535	83.162	88.064	92.699	95.517	100.797

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	11097.387	4227.679
2009	11624.834	5692.748
2010	26095.359	14299.346
2011	34712.121	10369.789
2012	35275.703	9853.577
2013	35191.767	9807.379
2014	35250.829	9845.521
2015	35290.953	9873.252
2016	35261.244	9848.628
2017	35271.787	9851.801
2018	35294.703	9853.722
2019	35227.939	9807.554
2020	35284.285	9869.384
2021	35316.306	9854.151
2022	35261.937	9876.512
2023	35276.937	9857.570
2024	35272.399	9855.947
2025	35272.065	9879.504
2026	35241.985	9845.334
2027	35266.291	9887.982
2028	35290.427	9858.619
2029	35214.867	9825.192
2030	35222.603	9828.845
2031	35230.507	9837.599
2032	35247.130	9855.787
2033	35196.312	9830.046
2034	35239.621	9856.672
2035	35214.889	9856.493
2036	35225.612	9832.907
2037	35251.619	9853.643
2038	35268.748	9818.495
2039	35219.088	9838.205
2040	35258.236	9869.738
2041	35253.255	9833.226
2042	35190.043	9814.258
2043	35294.146	9845.062
2044	35213.597	9838.373
2045	35239.157	9853.914
2046	35245.491	9839.788
2047	35273.259	9848.986
2048	35215.616	9829.259
2049	35225.008	9818.979
2050	35219.867	9828.911
2051	35260.635	9867.859
2052	35284.596	9879.747
2053	35274.472	9850.424
2054	35247.834	9854.373
2055	35251.086	9877.260
2056	35225.495	9841.038
2057	35227.857	9816.522

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	3750.265	4313.079	5066.045	7948.194	12286.003	13946.811	16507.432	16718.762	17254.815
2009	3748.500	4321.048	5097.564	8126.033	12325.694	14035.031	16550.662	17012.665	34851.228
2010	3989.299	5606.331	8448.629	13056.113	26246.543	34808.963	49642.530	53675.005	55703.856
2011	11071.875	23269.134	24506.666	26421.266	33575.112	38996.903	52933.785	54583.092	55934.640
2012	22817.375	23788.286	24982.968	26506.001	33744.943	39818.861	53001.321	54601.804	55907.833

2013	22816.519	23777.384	24979.562	26499.106	33703.928	39385.125	52971.918	54617.692	55900.436
2014	22821.650	23773.677	25004.219	26506.911	33737.802	39431.051	53047.253	54635.569	55894.914
2015	22819.363	23770.092	25001.132	26506.085	33755.868	39776.273	53082.142	54646.549	55924.313
2016	22822.469	23784.512	24976.186	26500.227	33739.746	39619.233	53005.570	54643.633	55928.591
2017	22812.322	23791.364	24972.186	26508.353	33750.709	39617.561	53047.658	54633.203	55915.282
2018	22808.169	23766.392	24981.574	26516.071	33763.777	39852.894	53024.822	54621.025	55911.329
2019	22821.626	23768.810	24953.138	26507.228	33754.065	39412.504	52975.893	54617.055	55901.740
2020	22839.042	23783.271	24973.818	26504.451	33757.003	39846.537	53008.501	54643.497	55920.760
2021	22815.274	23814.134	24983.895	26516.852	33777.229	39884.724	53015.059	54619.974	55906.587
2022	22804.186	23755.004	24958.318	26495.928	33722.311	39785.067	53045.085	54590.387	55898.135
2023	22806.540	23771.340	24973.925	26507.193	33757.958	39563.752	53061.449	54660.593	55912.103
2024	22827.465	23778.548	24969.191	26507.107	33740.692	39658.883	53055.043	54640.627	55922.120
2025	22820.947	23755.636	24937.349	26500.415	33740.831	39640.588	53084.621	54651.215	55925.800
2026	22800.903	23758.756	24954.411	26503.516	33746.582	39563.776	53020.110	54610.754	55897.663
2027	22820.246	23771.638	24951.280	26500.335	33732.186	39826.726	53097.485	54659.197	55921.071
2028	22823.089	23806.068	24990.862	26509.283	33758.118	39774.952	53067.017	54645.787	55916.424
2029	22817.267	23763.383	24944.653	26503.569	33730.850	39429.466	52982.692	54601.424	55894.291
2030	22809.603	23782.337	24972.138	26503.728	33712.568	39569.719	52979.569	54613.745	55899.879
2031	22808.481	23759.448	24959.400	26504.665	33745.198	39481.520	52986.024	54588.898	55905.619
2032	22824.619	23778.198	24948.263	26500.240	33731.078	39625.720	53033.572	54618.475	55907.527
2033	22808.228	23760.486	24957.587	26500.374	33712.803	39403.608	52977.362	54612.175	55896.999
2034	22814.349	23755.822	24925.887	26498.814	33715.356	39480.240	53037.057	54642.035	55926.024
2035	22811.665	23732.995	24892.492	26493.663	33721.341	39423.642	53012.225	54660.147	55900.639
2036	22808.406	23764.718	24992.655	26498.132	33741.758	39569.394	53010.008	54597.671	55910.219
2037	22809.224	23769.105	24986.911	26505.145	33741.837	39539.163	53052.300	54657.221	55911.676
2038	22813.694	23799.647	24981.685	26519.800	33761.672	39578.811	52992.184	54588.507	55911.190
2039	22820.696	23768.424	24951.976	26496.204	33718.707	39492.047	52994.321	54613.584	55899.075
2040	22814.932	23748.878	24943.042	26502.403	33730.433	39649.129	53086.773	54630.948	55904.713
2041	22789.518	23784.990	24993.376	26505.793	33742.497	39566.691	52987.249	54629.914	55901.890
2042	22798.474	23774.420	24969.153	26494.426	33744.322	39339.897	52947.488	54599.261	55907.353
2043	22819.386	23777.217	24986.036	26517.925	33767.037	39642.914	53035.988	54657.246	55922.407
2044	22811.939	23784.919	24964.443	26497.458	33705.831	39400.431	52998.990	54648.466	55909.665
2045	22802.288	23751.341	24947.526	26504.310	33718.837	39428.737	53038.068	54630.157	55914.139
2046	22816.219	23779.738	24951.273	26504.485	33733.714	39592.367	52991.402	54600.673	55916.182
2047	22816.992	23774.913	25009.056	26513.369	33749.665	39733.964	53023.796	54621.625	55906.331
2048	22803.668	23765.062	24916.445	26504.163	33728.629	39439.978	52975.824	54588.607	55905.213
2049	22804.216	23769.601	24983.070	26504.756	33742.283	39388.099	53007.609	54609.985	55897.133
2050	22816.605	23761.189	24940.937	26500.474	33734.115	39527.006	52995.673	54580.045	55901.173
2051	22815.486	23777.092	24954.021	26502.673	33735.408	39600.811	53023.254	54615.192	55917.884
2052	22803.857	23746.122	24936.786	26506.762	33739.523	39855.670	53048.788	54636.829	55914.460
2053	22833.935	23802.288	25013.729	26509.943	33745.513	39676.395	53037.925	54646.388	55919.307
2054	22797.962	23757.203	24971.674	26505.878	33727.173	39643.488	53026.440	54632.316	55899.276
2055	22811.790	23771.855	24952.956	26501.850	33693.282	39637.626	53055.257	54642.369	55914.429
2056	22805.696	23771.948	24953.588	26501.819	33721.510	39505.445	52991.070	54600.354	55907.206
2057	22805.845	23773.823	24984.426	26499.660	33739.085	39468.121	52955.722	54586.057	55898.286

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2008	1.432	0.000
2009	0.629	0.087
2010	0.681	0.126
2011	0.928	0.199
2012	1.225	0.268
2013	1.721	0.421
2014	2.461	0.570
2015	3.252	0.612
2016	3.972	0.623
2017	4.606	0.628
2018	5.113	0.611
2019	5.492	0.599
2020	5.772	0.591
2021	5.981	0.588
2022	6.135	0.586
2023	6.250	0.584
2024	6.335	0.584
2025	6.399	0.584
2026	6.445	0.584
2027	6.480	0.584
2028	6.506	0.584
2029	6.524	0.585
2030	6.538	0.585

2031	6.548	0.586
2032	6.555	0.586
2033	6.560	0.584
2034	6.563	0.583
2035	6.565	0.582
2036	6.566	0.582
2037	6.567	0.582
2038	6.568	0.581
2039	6.569	0.582
2040	6.569	0.583
2041	6.571	0.583
2042	6.571	0.583
2043	6.572	0.583
2044	6.572	0.584
2045	6.572	0.584
2046	6.573	0.583
2047	6.573	0.583
2048	6.573	0.583
2049	6.573	0.583
2050	6.573	0.582
2051	6.573	0.582
2052	6.573	0.582
2053	6.572	0.582
2054	6.573	0.581
2055	6.573	0.581
2056	6.574	0.581
2057	6.575	0.581

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1.432	1.432	1.432	1.432	1.432	1.432	1.432	1.432	1.432
2009	0.446	0.496	0.521	0.569	0.623	0.687	0.743	0.776	0.845
2010	0.463	0.508	0.537	0.592	0.664	0.747	0.847	0.918	1.053
2011	0.587	0.661	0.705	0.790	0.897	1.029	1.195	1.312	1.526
2012	0.728	0.838	0.907	1.038	1.198	1.382	1.567	1.705	2.001
2013	0.929	1.097	1.195	1.392	1.710	2.005	2.260	2.413	2.810
2014	1.290	1.596	1.736	2.012	2.463	2.856	3.211	3.410	3.792
2015	1.875	2.300	2.469	2.815	3.240	3.666	4.052	4.278	4.699
2016	2.616	2.993	3.177	3.538	3.952	4.387	4.790	5.031	5.485
2017	3.266	3.613	3.809	4.167	4.584	5.023	5.431	5.675	6.140
2018	3.824	4.157	4.345	4.683	5.088	5.517	5.919	6.165	6.620
2019	4.253	4.559	4.739	5.064	5.463	5.885	6.285	6.528	6.978
2020	4.564	4.854	5.031	5.348	5.740	6.161	6.558	6.803	7.247
2021	4.791	5.070	5.244	5.557	5.950	6.369	6.760	7.000	7.449
2022	4.952	5.231	5.399	5.713	6.103	6.521	6.913	7.151	7.604
2023	5.069	5.348	5.514	5.830	6.217	6.632	7.025	7.268	7.715
2024	5.155	5.435	5.598	5.917	6.302	6.718	7.113	7.352	7.800
2025	5.221	5.495	5.665	5.979	6.364	6.785	7.181	7.415	7.861
2026	5.265	5.544	5.711	6.026	6.411	6.831	7.223	7.468	7.902
2027	5.299	5.579	5.744	6.060	6.446	6.864	7.261	7.502	7.944
2028	5.328	5.602	5.773	6.086	6.471	6.891	7.285	7.527	7.969
2029	5.345	5.623	5.788	6.103	6.492	6.908	7.304	7.545	7.994
2030	5.355	5.637	5.803	6.114	6.507	6.922	7.314	7.558	8.007
2031	5.363	5.644	5.813	6.126	6.515	6.935	7.327	7.571	8.027
2032	5.377	5.654	5.821	6.134	6.523	6.940	7.337	7.571	8.038
2033	5.389	5.658	5.825	6.140	6.526	6.946	7.337	7.577	8.021
2034	5.394	5.662	5.828	6.143	6.529	6.950	7.339	7.580	8.019
2035	5.393	5.664	5.835	6.147	6.530	6.950	7.342	7.582	8.020
2036	5.397	5.668	5.834	6.146	6.532	6.951	7.343	7.583	8.026
2037	5.398	5.672	5.834	6.147	6.534	6.951	7.342	7.585	8.026
2038	5.396	5.670	5.837	6.147	6.537	6.950	7.343	7.584	8.019
2039	5.393	5.672	5.838	6.148	6.536	6.951	7.341	7.581	8.025
2040	5.391	5.668	5.838	6.150	6.537	6.954	7.341	7.585	8.028
2041	5.389	5.669	5.840	6.152	6.537	6.956	7.348	7.585	8.037
2042	5.394	5.669	5.839	6.153	6.538	6.956	7.346	7.585	8.033
2043	5.392	5.671	5.839	6.152	6.537	6.959	7.349	7.586	8.038
2044	5.395	5.671	5.841	6.152	6.539	6.957	7.350	7.587	8.046
2045	5.387	5.672	5.841	6.151	6.539	6.956	7.352	7.587	8.043
2046	5.391	5.673	5.839	6.153	6.539	6.958	7.351	7.587	8.039
2047	5.393	5.670	5.840	6.154	6.540	6.956	7.351	7.587	8.029
2048	5.397	5.667	5.840	6.156	6.539	6.954	7.352	7.587	8.032

2049	5.398	5.670	5.838	6.156	6.541	6.955	7.346	7.588	8.040
2050	5.391	5.669	5.841	6.157	6.543	6.956	7.347	7.585	8.031
2051	5.391	5.672	5.839	6.155	6.541	6.959	7.346	7.580	8.026
2052	5.394	5.669	5.839	6.155	6.542	6.959	7.349	7.580	8.020
2053	5.393	5.669	5.840	6.156	6.538	6.957	7.346	7.582	8.023
2054	5.400	5.672	5.840	6.154	6.540	6.956	7.348	7.582	8.031
2055	5.404	5.677	5.843	6.154	6.539	6.957	7.346	7.584	8.031
2056	5.403	5.680	5.843	6.156	6.540	6.956	7.346	7.587	8.030
2057	5.404	5.675	5.842	6.156	6.542	6.958	7.352	7.588	8.025

PERCENTILES OF INITIAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	2091.	3185.	3926.	5805.	8765.	13380.	19130.	22498.	29579.
2	1507.	1897.	2082.	2427.	2894.	3514.	4103.	4519.	5196.
3	2449.	2820.	3001.	3402.	3804.	4277.	4690.	5032.	5436.
4	2200.	2566.	2815.	3150.	3598.	4074.	4478.	4722.	5275.
5	1041.	1252.	1348.	1559.	1789.	2046.	2317.	2531.	2795.
6	59.	85.	107.	143.	190.	238.	295.	333.	397.
7+	14.	23.	32.	51.	89.	141.	203.	241.	347.

PERCENTILES OF FINAL PERIOD NUMBERS AT AGE VECTOR (000s FISH)

AGE	1%	5%	10%	25%	50%	75%	90%	95%	99%
1	22806.	23772.	24954.	26502.	33722.	39505.	52991.	54600.	55907.
2	18658.	19443.	20410.	21676.	27558.	32420.	43395.	44693.	45734.
3	15057.	15690.	16492.	17506.	22275.	26182.	35021.	36081.	36918.
4	11646.	12140.	12758.	13521.	17212.	20237.	27052.	27872.	28521.
5	8651.	9008.	9460.	10055.	12799.	15119.	20124.	20727.	21211.
6	6418.	6689.	7020.	7456.	9490.	11140.	14916.	15364.	15730.
7+	22645.	23895.	24675.	26165.	28164.	30470.	32594.	33875.	36207.

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2008	0.339	0.046
2009	0.124	0.000
2010	0.099	0.000
2011	0.099	0.000
2012	0.099	0.000
2013	0.099	0.000
2014	0.099	0.000
2015	0.099	0.000
2016	0.099	0.000
2017	0.099	0.000
2018	0.099	0.000
2019	0.099	0.000
2020	0.099	0.000
2021	0.099	0.000
2022	0.099	0.000
2023	0.099	0.000
2024	0.099	0.000
2025	0.099	0.000
2026	0.099	0.000
2027	0.099	0.000
2028	0.099	0.000
2029	0.099	0.000
2030	0.099	0.000
2031	0.099	0.000
2032	0.099	0.000
2033	0.099	0.000
2034	0.099	0.000
2035	0.099	0.000
2036	0.099	0.000
2037	0.099	0.000
2038	0.099	0.000
2039	0.099	0.000
2040	0.099	0.000
2041	0.099	0.000
2042	0.099	0.000
2043	0.099	0.000
2044	0.099	0.000
2045	0.099	0.000
2046	0.099	0.000

2047	0.099	0.000
2048	0.099	0.000
2049	0.099	0.000
2050	0.099	0.000
2051	0.099	0.000
2052	0.099	0.000
2053	0.099	0.000
2054	0.099	0.000
2055	0.099	0.000
2056	0.099	0.000
2057	0.099	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.243	0.272	0.284	0.306	0.335	0.365	0.397	0.422	0.473
2009	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124
2010	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2011	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2012	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2013	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2014	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2015	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2016	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2017	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2018	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2019	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2020	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2021	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2022	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2023	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2024	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2025	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2026	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2027	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2028	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2029	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2030	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2031	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2032	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2033	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2034	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2035	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2036	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2037	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2038	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2039	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2040	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2041	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2042	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2043	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2044	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2045	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2046	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2047	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2048	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2049	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2050	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2051	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2052	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2053	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2054	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2055	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2056	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
2057	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099

Redfish

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AGEPRO VERSION 3.2

 PROJECTION RUN: redfish

 INPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\NRED\N_RED_NEWEST08CAT_75%FMSY.IN
 OUTPUT FILE: C:\NIT\GARM_III_PDT_PROJ_EST08CAT_A16\NRED\N_RED_NEWEST08CAT_75%FMSY.OUT
 RECRUITMENT MODEL:   14
 NUMBER OF BOOTSTRAP REALIZATIONS:   100
 NUMBER OF SIMULATIONS PER BOOTSTRAP REALIZATION:   1000
 TOTAL NUMBER OF SIMULATIONS:   100000
 NUMBER OF FEASIBLE SIMULATIONS:   100000
 PROPORTION OF SIMULATIONS THAT ARE FEASIBLE:   1.00000000000000

 MIXTURE OF F AND QUOTA BASED CATCHES
 YEAR   F       QUOTA (THOUSAND MT)
 2008             1.364
 2009  0.006
 2010  0.029
 2011  0.029
 2012  0.029
 2013  0.029
 2014  0.029
 2015  0.029
 2016  0.029
 2017  0.029
 2018  0.029
 2019  0.029
 2020  0.029
 2021  0.029
 2022  0.029
 2023  0.029
 2024  0.029
 2025  0.029
 2026  0.029
 2027  0.029
 2028  0.029
 2029  0.029
 2030  0.029
 2031  0.029
 2032  0.029
 2033  0.029
 2034  0.029
 2035  0.029
 2036  0.029
 2037  0.029
 2038  0.029
 2039  0.029
 2040  0.029
 2041  0.029
 2042  0.029
 2043  0.029
 2044  0.029
 2045  0.029
 2046  0.029
 2047  0.029
 2048  0.029
 2049  0.029
 2050  0.029
 2051  0.029
 2052  0.029
 2053  0.029
 2054  0.029
 2055  0.029
 2056  0.029
 2057  0.029

 SPAWNING STOCK BIOMASS (THOUSAND MT)
 YEAR    AVG SSB (000 MT)    STD
 2008       203.030        13.981
```

2009	234.029	16.030
2010	264.325	17.917
2011	291.358	19.900
2012	317.054	22.699
2013	340.202	26.477
2014	359.881	30.888
2015	375.545	35.362
2016	387.276	39.537
2017	395.530	43.279
2018	400.771	46.535
2019	403.528	49.325
2020	404.381	51.698
2021	403.762	53.704
2022	402.051	55.394
2023	399.542	56.812
2024	396.449	57.999
2025	392.945	58.996
2026	389.047	59.834
2027	385.036	60.544
2028	380.860	61.145
2029	376.789	61.655
2030	372.776	62.093
2031	368.871	62.461
2032	365.138	62.768
2033	361.390	62.975
2034	357.927	63.161
2035	354.714	63.311
2036	351.732	63.422
2037	348.963	63.501
2038	346.393	63.553
2039	344.011	63.588
2040	341.805	63.612
2041	339.762	63.630
2042	337.873	63.646
2043	336.127	63.662
2044	334.514	63.679
2045	333.023	63.693
2046	331.646	63.701
2047	330.372	63.703
2048	329.194	63.698
2049	328.104	63.687
2050	327.097	63.672
2051	326.165	63.655
2052	325.303	63.637
2053	324.503	63.617
2054	323.761	63.596
2055	323.074	63.575
2056	322.441	63.552
2057	321.862	63.526

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	171.011	178.943	184.292	192.481	204.380	211.220	223.997	225.880	233.607
2009	198.239	204.396	213.536	222.317	235.906	243.230	256.511	261.020	267.428
2010	225.503	229.304	240.620	251.737	265.369	275.921	287.689	295.942	301.503
2011	247.530	252.772	264.383	278.308	292.929	305.084	315.740	326.074	336.586
2012	266.321	275.826	287.765	303.356	317.165	331.992	346.677	353.938	369.336
2013	282.446	295.835	304.262	323.019	340.017	357.429	374.520	390.369	402.157
2014	295.701	309.674	320.455	338.976	358.291	377.843	401.160	419.450	437.394
2015	305.875	319.846	331.637	351.821	372.990	394.843	424.643	443.653	468.393
2016	311.629	327.255	339.050	360.573	384.019	408.544	442.561	463.406	493.596
2017	313.480	330.923	343.520	365.776	391.428	419.365	455.240	478.392	513.295
2018	312.733	331.813	345.157	368.430	395.947	427.220	464.467	488.830	527.962
2019	310.086	330.830	344.502	368.976	398.282	432.398	470.728	495.730	538.313
2020	305.867	328.293	342.292	367.809	398.887	435.390	474.583	499.599	544.443
2021	300.867	324.427	339.037	365.598	398.264	436.662	476.246	501.672	548.466
2022	295.529	319.747	334.998	362.582	396.784	436.497	476.278	502.034	550.618
2023	289.414	314.739	330.329	358.949	394.437	435.210	475.524	501.099	551.016
2024	283.497	309.571	325.493	354.830	391.482	433.192	474.005	499.651	549.899
2025	277.326	304.358	320.410	350.629	388.244	430.559	471.669	497.545	548.553
2026	270.772	298.922	315.187	346.054	384.664	427.244	468.625	494.520	545.960

2027	264.657	293.675	310.227	341.634	380.818	423.796	465.521	491.700	542.583
2028	258.566	288.135	305.138	337.082	376.804	420.034	461.992	488.475	539.489
2029	252.615	282.935	300.339	332.733	372.893	416.361	458.516	484.991	536.276
2030	247.267	278.088	295.800	328.329	368.841	412.695	454.757	481.729	532.978
2031	242.109	273.448	291.466	324.118	364.888	409.114	451.533	477.935	529.705
2032	236.760	268.981	287.431	320.352	361.290	405.631	448.073	474.509	526.768
2033	232.517	264.513	283.311	316.562	357.650	401.953	444.500	471.458	523.304
2034	228.492	260.608	279.363	313.055	354.246	398.569	441.325	468.255	520.034
2035	224.708	257.164	275.950	309.859	351.105	395.441	438.366	465.273	517.382
2036	221.055	253.883	272.651	306.777	348.115	392.607	435.526	462.547	514.571
2037	218.030	251.092	269.650	304.037	345.351	389.937	432.693	459.660	511.728
2038	215.878	248.064	267.033	301.509	342.738	387.278	430.043	457.195	508.389
2039	212.904	245.699	264.673	299.109	340.331	385.012	427.918	454.932	505.912
2040	210.819	243.369	262.419	296.979	338.171	382.866	425.803	452.624	503.283
2041	208.730	241.254	260.214	294.907	336.059	380.711	423.970	450.877	501.223
2042	207.025	239.365	258.288	293.035	334.231	378.912	422.139	449.216	499.486
2043	205.155	237.554	256.616	291.437	332.432	377.277	420.611	447.177	497.970
2044	203.752	235.769	255.068	289.676	330.824	375.780	419.037	445.104	496.360
2045	202.276	234.112	253.822	288.138	329.319	374.292	417.657	443.575	494.844
2046	200.527	232.874	252.315	286.750	327.887	372.755	415.991	442.230	494.140
2047	199.182	231.830	251.127	285.463	326.696	371.514	414.406	440.930	492.877
2048	198.108	230.789	249.977	284.231	325.610	370.321	413.249	439.590	491.151
2049	197.681	229.774	248.950	283.023	324.543	369.385	412.280	438.211	490.170
2050	196.473	228.891	247.818	282.154	323.425	368.396	411.208	437.146	489.843
2051	195.374	227.994	246.873	281.099	322.553	367.389	410.395	436.268	488.662
2052	193.990	227.097	246.167	280.207	321.645	366.554	409.482	435.459	487.644
2053	193.352	226.269	245.327	279.314	320.836	365.831	408.464	434.654	486.847
2054	192.176	225.652	244.812	278.588	320.134	365.035	407.608	433.900	486.050
2055	190.915	225.094	244.106	277.901	319.507	364.263	406.884	433.171	484.911
2056	190.240	224.479	243.358	277.413	318.993	363.673	406.240	432.754	483.222
2057	189.487	223.670	242.791	277.042	318.456	362.964	405.615	432.339	482.455

MEAN BIOMASS (THOUSAND MT) FOR AGES: 1 TO 26

YEAR	AVG MEAN B (000 MT)	STD
2008	242.836	16.489
2009	275.763	18.644
2010	305.975	21.211
2011	331.510	24.454
2012	354.128	28.391
2013	373.290	32.655
2014	388.865	36.909
2015	400.902	40.882
2016	409.779	44.498
2017	415.952	47.743
2018	419.757	50.597
2019	421.568	53.075
2020	421.821	55.205
2021	420.833	57.022
2022	418.903	58.563
2023	416.270	59.868
2024	413.116	60.972
2025	409.590	61.910
2026	405.695	62.702
2027	401.700	63.371
2028	397.548	63.935
2029	393.503	64.415
2030	389.517	64.828
2031	385.636	65.177
2032	381.920	65.464
2033	378.185	65.650
2034	374.731	65.810
2035	371.526	65.930
2036	368.554	66.018
2037	365.798	66.082
2038	363.244	66.130
2039	360.879	66.166
2040	358.691	66.195
2041	356.667	66.220
2042	354.796	66.242
2043	353.066	66.261

2044	351.466	66.274
2045	349.987	66.277
2046	348.619	66.273
2047	347.354	66.265
2048	346.184	66.255
2049	345.103	66.240
2050	344.103	66.222
2051	343.176	66.202
2052	342.315	66.183
2053	341.517	66.165
2054	340.781	66.145
2055	340.105	66.121
2056	339.488	66.094
2057	338.925	66.070

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	206.252	211.293	221.376	230.893	244.125	252.906	264.841	271.456	276.238
2009	235.535	237.922	251.083	262.747	275.395	289.217	298.519	309.109	315.839
2010	259.159	265.433	278.461	292.639	306.182	319.410	333.644	341.004	354.694
2011	277.490	289.001	298.906	316.369	332.008	347.758	363.246	373.761	387.408
2012	293.369	307.076	316.391	335.116	353.451	371.889	391.171	408.507	422.368
2013	306.375	320.520	331.798	351.155	371.434	392.102	417.595	435.733	456.479
2014	316.429	331.214	343.157	363.999	386.291	409.177	440.146	459.484	486.078
2015	322.020	338.783	351.074	373.108	397.590	423.349	457.640	478.879	510.715
2016	324.461	343.187	356.220	379.043	405.619	434.813	470.859	494.113	530.071
2017	324.680	344.945	358.662	382.718	411.114	443.523	481.264	505.553	545.705
2018	323.070	345.015	358.953	384.267	414.474	449.687	488.608	513.623	556.943
2019	319.708	343.198	357.705	384.040	416.056	453.646	493.387	518.954	564.946
2020	315.626	339.946	355.152	382.560	416.390	455.730	496.300	522.259	570.063
2021	310.581	335.971	351.769	380.211	415.533	456.341	497.197	523.491	573.597
2022	305.134	331.357	347.563	377.011	413.730	455.712	497.361	523.632	574.392
2023	299.352	326.479	343.042	373.385	411.208	454.251	496.198	522.801	574.382
2024	293.333	321.475	338.118	369.415	408.372	451.939	494.337	521.074	573.402
2025	286.914	316.397	333.227	365.175	405.014	449.124	491.868	519.005	571.448
2026	280.652	310.964	328.181	360.747	401.315	445.850	489.072	516.098	568.902
2027	274.759	305.659	323.230	356.302	397.551	442.215	485.687	513.135	566.296
2028	268.613	300.184	318.223	351.809	393.514	438.697	482.228	509.811	562.832
2029	263.131	295.125	313.655	347.440	389.441	434.993	478.516	506.338	559.704
2030	257.480	290.311	309.147	343.173	385.596	431.323	475.143	502.624	556.413
2031	252.113	285.579	304.859	339.170	381.722	427.618	471.664	499.193	553.351
2032	247.937	281.189	300.713	335.347	378.092	424.078	468.383	496.129	550.400
2033	243.536	276.844	296.466	331.600	374.389	420.416	464.812	492.761	546.476
2034	239.293	273.256	292.739	328.123	371.025	417.084	461.574	489.588	543.539
2035	235.495	269.631	289.301	324.788	367.826	413.981	458.484	486.522	540.728
2036	232.199	266.605	286.095	321.929	364.880	411.133	455.562	483.641	537.428
2037	229.516	263.436	283.294	319.126	362.068	408.300	452.924	480.803	534.099
2038	226.930	260.946	280.729	316.535	359.530	405.826	450.532	478.241	531.682
2039	224.481	258.214	278.263	314.317	357.143	403.539	448.212	476.029	528.554
2040	222.144	256.021	275.968	312.054	354.929	401.333	446.334	474.107	526.338
2041	219.833	254.100	273.719	310.104	352.954	399.301	444.401	472.287	524.703
2042	218.286	252.081	272.005	308.249	351.032	397.584	442.712	470.158	523.261
2043	216.544	250.123	270.389	306.410	349.294	395.866	441.008	468.081	521.414
2044	214.723	248.344	269.050	304.789	347.643	394.270	439.364	466.486	520.068
2045	213.337	247.153	267.432	303.225	346.220	392.837	437.713	465.102	518.947
2046	211.859	245.878	266.089	301.981	344.836	391.467	436.085	463.308	517.539
2047	210.798	244.936	264.883	300.638	343.677	390.239	434.741	461.891	516.032
2048	210.004	243.836	263.736	299.299	342.574	389.124	433.675	460.501	514.927
2049	208.948	242.857	262.578	298.376	341.382	388.032	432.579	459.460	513.853
2050	207.496	241.828	261.686	297.309	340.410	387.048	431.669	458.501	513.291
2051	206.244	240.786	260.751	296.246	339.523	386.270	430.557	457.844	511.484
2052	205.442	239.831	259.948	295.337	338.569	385.347	429.488	456.765	510.453
2053	204.009	239.339	259.302	294.537	337.813	384.438	428.708	455.993	510.112
2054	202.912	238.754	258.508	293.838	337.062	383.650	427.994	455.118	508.790
2055	202.125	238.038	257.767	293.250	336.647	382.960	427.192	454.771	507.141
2056	201.489	237.167	257.171	292.883	336.030	382.391	426.462	454.143	506.280
2057	200.759	236.513	256.612	292.362	335.456	381.718	425.854	453.581	505.130

F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 26

YEAR AVG F_WT_B STD

2008	0.006	0.000
2009	0.005	0.000
2010	0.025	0.001
2011	0.025	0.001
2012	0.026	0.001
2013	0.026	0.001
2014	0.027	0.001
2015	0.028	0.001
2016	0.028	0.001
2017	0.028	0.001
2018	0.028	0.001
2019	0.028	0.001
2020	0.028	0.001
2021	0.028	0.001
2022	0.028	0.001
2023	0.028	0.001
2024	0.028	0.001
2025	0.028	0.001
2026	0.028	0.001
2027	0.028	0.001
2028	0.028	0.001
2029	0.028	0.001
2030	0.028	0.001
2031	0.028	0.001
2032	0.027	0.001
2033	0.027	0.001
2034	0.027	0.001
2035	0.027	0.001
2036	0.027	0.001
2037	0.027	0.001
2038	0.027	0.001
2039	0.027	0.001
2040	0.027	0.001
2041	0.027	0.001
2042	0.027	0.001
2043	0.027	0.001
2044	0.027	0.001
2045	0.027	0.001
2046	0.027	0.001
2047	0.027	0.001
2048	0.027	0.001
2049	0.027	0.001
2050	0.027	0.001
2051	0.027	0.001
2052	0.027	0.001
2053	0.027	0.001
2054	0.027	0.001
2055	0.027	0.001
2056	0.027	0.001
2057	0.027	0.001

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES: 1 TO 26

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.007
2009	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
2010	0.022	0.023	0.024	0.024	0.025	0.025	0.026	0.026	0.026
2011	0.022	0.023	0.024	0.025	0.025	0.026	0.026	0.026	0.027
2012	0.024	0.024	0.025	0.025	0.026	0.027	0.027	0.027	0.027
2013	0.024	0.025	0.025	0.026	0.027	0.027	0.027	0.028	0.028
2014	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.028
2015	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2016	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2017	0.026	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2018	0.026	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2019	0.026	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2020	0.026	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2021	0.026	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2022	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2023	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2024	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029

2026	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2027	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2028	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2029	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2030	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2031	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2032	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029	0.029
2033	0.026	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2034	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2035	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2036	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2037	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2038	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2039	0.025	0.026	0.026	0.027	0.028	0.028	0.028	0.028	0.029
2040	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2041	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2042	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2043	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2044	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2045	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2046	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2047	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2048	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2049	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2050	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2051	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2052	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2053	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2054	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2055	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2056	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029
2057	0.025	0.026	0.026	0.027	0.027	0.028	0.028	0.028	0.029

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2008	249.651	16.905
2009	283.420	19.161
2010	317.549	21.985
2011	344.114	25.320
2012	367.751	29.407
2013	387.733	33.830
2014	404.046	38.293
2015	416.656	42.463
2016	425.886	46.219
2017	432.306	49.597
2018	436.264	52.569
2019	438.148	55.148
2020	438.410	57.366
2021	437.382	59.257
2022	435.375	60.861
2023	432.637	62.219
2024	429.357	63.369
2025	425.689	64.344
2026	421.638	65.168
2027	417.484	65.865
2028	413.166	66.452
2029	408.959	66.951
2030	404.814	67.381
2031	400.777	67.744
2032	396.912	68.043
2033	393.028	68.237
2034	389.436	68.403
2035	386.103	68.529
2036	383.013	68.621
2037	380.146	68.687
2038	377.490	68.737
2039	375.030	68.775
2040	372.755	68.805
2041	370.649	68.830
2042	368.704	68.853

2043	366.905	68.873
2044	365.241	68.886
2045	363.702	68.890
2046	362.279	68.886
2047	360.963	68.878
2048	359.747	68.867
2049	358.623	68.852
2050	357.583	68.833
2051	356.619	68.812
2052	355.723	68.793
2053	354.893	68.774
2054	354.128	68.753
2055	353.425	68.728
2056	352.783	68.700
2057	352.197	68.676

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	212.145	217.313	227.650	237.407	250.973	259.975	272.211	278.993	283.896
2009	242.087	244.540	258.056	270.041	283.046	297.238	306.821	317.684	324.572
2010	269.031	275.444	288.893	303.710	317.857	331.475	345.920	353.924	368.015
2011	288.114	299.982	310.415	328.494	344.625	360.966	376.964	387.548	401.959
2012	304.740	318.927	328.596	348.099	367.076	386.219	406.081	424.020	438.269
2013	318.282	333.020	344.718	364.811	385.833	407.273	433.612	452.430	473.793
2014	328.856	344.167	356.633	378.257	401.374	425.122	457.227	477.345	504.814
2015	334.751	352.131	364.882	387.790	413.234	439.924	475.612	497.694	530.733
2016	337.358	356.744	370.283	393.976	421.570	451.848	489.389	513.532	550.890
2017	337.528	358.523	372.808	397.772	427.270	460.908	500.147	525.434	567.138
2018	335.844	358.577	373.091	399.405	430.776	467.348	507.844	533.901	578.877
2019	332.303	356.736	371.793	399.154	432.431	471.451	512.750	539.385	587.132
2020	328.010	353.350	369.155	397.641	432.760	473.657	515.830	542.828	592.465
2021	322.862	349.182	365.612	395.163	431.856	474.270	516.750	544.087	596.170
2022	317.122	344.414	361.226	391.841	429.985	473.611	516.903	544.169	596.960
2023	311.156	339.314	356.543	388.045	427.363	472.122	515.714	543.345	597.090
2024	304.897	334.123	351.418	383.925	424.424	469.700	513.798	541.522	596.008
2025	298.253	328.835	346.327	379.536	420.910	466.756	511.252	539.405	593.966
2026	291.679	323.145	341.102	374.908	417.097	463.373	508.305	536.323	591.186
2027	285.564	317.662	335.924	370.288	413.148	459.609	504.754	533.324	588.608
2028	279.150	311.972	330.744	365.662	408.978	455.915	501.201	529.889	584.881
2029	273.454	306.706	325.960	361.056	404.720	452.094	497.345	526.262	581.788
2030	267.622	301.714	321.315	356.637	400.705	448.252	493.815	522.371	578.330
2031	262.001	296.751	316.826	352.483	396.718	444.449	490.199	518.827	575.021
2032	257.652	292.200	312.487	348.506	392.927	440.745	486.796	515.562	572.098
2033	253.138	287.680	308.088	344.596	389.095	436.949	483.100	512.098	567.954
2034	248.677	283.945	304.231	340.972	385.579	433.472	479.658	508.827	564.897
2035	244.712	280.128	300.617	337.539	382.245	430.242	476.505	505.674	561.874
2036	241.289	277.044	297.332	334.560	379.169	427.303	473.421	502.634	558.557
2037	238.488	273.730	294.399	331.628	376.243	424.315	470.723	499.680	555.053
2038	235.842	271.192	291.728	328.925	373.629	421.756	468.230	497.063	552.506
2039	233.251	268.328	289.169	326.632	371.161	419.366	465.809	494.737	549.362
2040	230.790	266.045	286.781	324.287	368.858	417.041	463.839	492.759	547.026
2041	228.459	264.038	284.441	322.248	366.787	414.985	461.837	490.844	545.248
2042	226.867	261.929	282.655	320.338	364.801	413.173	460.114	488.630	543.842
2043	225.008	259.903	280.970	318.398	362.967	411.408	458.318	486.490	541.934
2044	223.209	258.054	279.555	316.745	361.257	409.740	456.623	484.772	540.521
2045	221.683	256.811	277.921	315.074	359.769	408.210	454.871	483.312	539.312
2046	220.148	255.490	276.499	313.801	358.341	406.829	453.192	481.484	538.013
2047	219.027	254.446	275.249	312.414	357.141	405.555	451.788	480.037	536.310
2048	218.262	253.369	274.053	311.013	355.995	404.373	450.723	478.596	535.159
2049	217.075	252.352	272.855	310.060	354.759	403.245	449.558	477.458	534.037
2050	215.666	251.257	271.900	308.948	353.738	402.222	448.608	476.498	533.433
2051	214.250	250.191	270.942	307.849	352.838	401.389	447.435	475.786	531.627
2052	213.442	249.181	270.099	306.897	351.837	400.454	446.354	474.700	530.480
2053	212.010	248.689	269.423	306.067	351.034	399.500	445.519	473.907	530.083
2054	210.843	248.076	268.603	305.303	350.263	398.672	444.778	472.995	528.727
2055	210.030	247.328	267.839	304.740	349.810	397.998	443.980	472.619	527.182
2056	209.286	246.460	267.206	304.364	349.179	397.378	443.217	471.972	526.243
2057	208.594	245.717	266.636	303.797	348.597	396.665	442.532	471.392	525.005

RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	AVG RECRUITMENT	STD
2008	44615.613	54106.829
2009	44517.350	54107.457
2010	44752.046	54194.617
2011	44314.560	53899.381
2012	44456.039	53819.741
2013	44104.168	53733.053
2014	44455.127	54056.013
2015	44633.753	54167.352
2016	44461.269	54006.378
2017	44524.090	54006.208
2018	44617.423	54001.648
2019	44257.407	53729.955
2020	44557.903	53993.555
2021	44638.620	53881.714
2022	44439.968	53972.842
2023	44617.026	54135.181
2024	44523.857	54052.260
2025	44609.423	54253.907
2026	44381.656	53847.126
2027	44614.155	54319.928
2028	44610.213	54135.077
2029	44135.898	53678.191
2030	44203.061	53783.845
2031	44266.837	53746.925
2032	44440.081	53991.008
2033	44155.423	53808.693
2034	44431.859	54090.189
2035	44316.861	53993.496
2036	44261.354	53728.072
2037	44503.276	54098.724
2038	44374.229	53689.577
2039	44256.825	53861.294
2040	44515.125	54112.628
2041	44374.196	53891.237
2042	44068.752	53572.976
2043	44602.197	54040.984
2044	44256.347	53982.917
2045	44380.055	53984.376
2046	44330.109	53785.133
2047	44478.771	53940.142
2048	44184.861	53656.001
2049	44247.338	53758.444
2050	44188.993	53656.166
2051	44444.582	53990.308
2052	44611.861	54129.833
2053	44531.767	54036.250
2054	44398.042	53948.940
2055	44458.837	54177.475
2056	44231.971	53751.730
2057	44154.440	53578.037

PERCENTILES OF RECRUITMENT UNITS ARE: 1000.00000000000 FISH

YEAR CLASS	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	951.065	1101.949	1425.334	4082.292	18371.868	58759.504	132736.710	190627.295	202216.979
2009	948.145	1101.310	1425.252	4050.863	18241.440	58643.950	132746.051	190494.038	202246.677
2010	947.166	1102.703	1427.135	4105.187	18455.554	58773.982	132739.365	190631.753	202391.597
2011	946.963	1103.893	1427.078	4004.321	18170.888	58562.366	132624.288	190409.688	202586.192
2012	951.548	1104.470	1427.428	4052.230	18313.423	58771.672	132613.170	190272.422	202196.459
2013	949.368	1103.365	1427.015	3980.093	18092.040	58333.254	132555.862	190377.674	202103.944
2014	950.835	1103.108	1428.437	4056.195	18273.783	58379.224	132701.745	190497.982	202034.869
2015	950.182	1102.859	1428.259	4048.141	18370.709	58724.782	132769.307	190571.877	202402.595
2016	951.070	1103.859	1426.820	3991.023	18284.209	58567.588	132621.028	190552.249	202456.098
2017	948.168	1104.334	1426.589	4070.249	18343.029	58565.916	132702.531	190482.060	202289.631
2018	946.980	1102.603	1427.131	4145.502	18413.144	58801.476	132658.308	190400.105	202240.179
2019	950.829	1102.770	1425.491	4059.284	18361.038	58360.659	132563.560	190373.386	202120.244
2020	955.809	1103.773	1426.683	4032.212	18376.796	58795.113	132626.704	190551.336	202358.156
2021	949.012	1105.912	1427.264	4153.118	18485.316	58833.337	132639.403	190393.033	202180.879
2022	945.841	1101.813	1425.789	3949.112	18190.671	58733.584	132697.548	190193.916	202075.151

2023	946.514	1102.946	1426.689	4058.947	18381.924	58512.054	132729.236	190666.384	202249.873
2024	952.499	1103.445	1426.416	4058.108	18289.289	58607.277	132716.831	190532.019	202375.164
2025	950.634	1101.857	1424.580	3992.857	18290.032	58588.965	132774.106	190603.273	202421.196
2026	944.903	1102.074	1425.564	4023.096	18320.890	58512.079	132649.185	190330.986	202069.254
2027	950.434	1102.966	1425.383	3992.075	18243.654	58775.283	132799.017	190656.993	202362.032
2028	951.247	1105.353	1427.666	4079.317	18382.782	58723.459	132740.017	190566.746	202303.922
2029	949.582	1102.394	1425.001	4023.605	18236.485	58377.637	132576.726	190268.193	202027.074
2030	947.390	1103.708	1426.586	4025.164	18138.399	58518.027	132570.680	190351.114	202096.964
2031	947.070	1102.122	1425.852	4034.296	18313.463	58429.742	132583.178	190183.899	202168.764
2032	951.685	1103.421	1425.209	3991.147	18237.707	58574.082	132675.253	190382.945	202192.634
2033	946.997	1102.193	1425.747	3992.454	18139.657	58351.755	132566.405	190340.546	202060.950
2034	948.748	1101.870	1423.919	3977.250	18153.355	58428.461	132682.002	190541.499	202423.985
2035	947.980	1100.288	1421.993	3927.032	18185.465	58371.808	132633.915	190663.382	202106.476
2036	947.048	1102.487	1427.770	3970.600	18295.007	58517.702	132629.623	190242.936	202226.297
2037	947.282	1102.791	1427.438	4038.975	18295.428	58487.441	132711.519	190643.694	202244.525
2038	948.560	1104.908	1427.137	4181.856	18401.850	58527.128	132595.107	190181.267	202238.448
2039	950.563	1102.744	1425.424	3951.803	18171.335	58440.280	132599.245	190350.027	202086.915
2040	948.914	1101.389	1424.908	4012.236	18234.247	58597.514	132778.274	190466.885	202157.442
2041	941.647	1103.892	1427.811	4045.288	18298.973	58514.996	132585.551	190459.925	202122.122
2042	944.208	1103.159	1426.414	3934.468	18308.764	58287.982	132508.556	190253.638	202190.457
2043	950.188	1103.353	1427.388	4163.574	18430.634	58591.293	132679.931	190643.862	202378.752
2044	948.058	1103.887	1426.143	3964.024	18102.251	58348.575	132608.286	190584.777	202219.376
2045	945.299	1101.560	1425.167	4030.833	18172.033	58376.908	132683.960	190461.564	202275.341
2046	949.282	1103.528	1425.383	4032.540	18251.849	58540.697	132593.593	190263.138	202300.886
2047	949.504	1103.193	1428.716	4119.161	18337.429	58682.432	132656.322	190404.143	202177.668
2048	945.693	1102.511	1423.374	4029.399	18224.569	58388.160	132563.426	190181.941	202163.690
2049	945.850	1102.825	1427.217	4035.183	18297.824	58336.230	132624.976	190325.811	202062.622
2050	949.393	1102.242	1424.787	3993.438	18254.001	58475.273	132601.864	190124.322	202113.156
2051	949.073	1103.345	1425.541	4014.875	18260.937	58549.149	132655.273	190360.848	202322.185
2052	945.747	1101.198	1424.548	4054.743	18283.015	58804.255	132704.718	190506.464	202279.353
2053	954.349	1105.091	1428.985	4085.755	18315.152	58624.807	132683.683	190570.791	202339.970
2054	944.061	1101.966	1426.560	4046.118	18216.757	58591.868	132661.442	190476.091	202089.426
2055	948.016	1102.982	1425.480	4006.846	18034.927	58586.000	132717.246	190543.745	202278.965
2056	946.273	1102.988	1425.517	4006.550	18186.372	58453.691	132592.949	190260.992	202188.625
2057	946.316	1103.118	1427.295	3985.501	18280.665	58416.330	132524.499	190164.781	202077.050

LANDINGS (000 MT)

YEAR	AVG LANDINGS (000 MT)	STD
2008	1.364	0.000
2009	1.386	0.098
2010	7.563	0.538
2011	8.318	0.576
2012	9.196	0.644
2013	9.855	0.741
2014	10.531	0.918
2015	11.060	1.107
2016	11.313	1.201
2017	11.492	1.301
2018	11.603	1.388
2019	11.655	1.464
2020	11.662	1.529
2021	11.633	1.584
2022	11.577	1.631
2023	11.501	1.671
2024	11.409	1.704
2025	11.307	1.732
2026	11.194	1.755
2027	11.078	1.775
2028	10.957	1.792
2029	10.840	1.806
2030	10.724	1.819
2031	10.612	1.829
2032	10.505	1.838
2033	10.397	1.844
2034	10.298	1.850
2035	10.205	1.854
2036	10.120	1.858
2037	10.040	1.860
2038	9.965	1.861
2039	9.896	1.861
2040	9.833	1.861

2041	9.774	1.862
2042	9.720	1.862
2043	9.670	1.863
2044	9.623	1.863
2045	9.580	1.864
2046	9.541	1.865
2047	9.504	1.865
2048	9.470	1.865
2049	9.439	1.864
2050	9.410	1.864
2051	9.383	1.863
2052	9.358	1.862
2053	9.335	1.862
2054	9.314	1.862
2055	9.294	1.861
2056	9.276	1.860
2057	9.259	1.859

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	1.364	1.364	1.364	1.364	1.364	1.364	1.364	1.364	1.364
2009	1.166	1.219	1.252	1.318	1.393	1.445	1.521	1.545	1.600
2010	6.357	6.581	6.853	7.221	7.586	7.883	8.278	8.522	8.674
2011	7.051	7.185	7.502	7.980	8.356	8.711	9.030	9.349	9.522
2012	7.748	7.946	8.352	8.799	9.224	9.649	9.989	10.179	10.702
2013	8.208	8.620	8.859	9.383	9.842	10.366	10.766	11.107	11.669
2014	8.624	9.060	9.336	9.910	10.490	11.066	11.739	12.344	12.827
2015	8.991	9.355	9.700	10.322	10.953	11.627	12.598	13.270	14.102
2016	9.094	9.519	9.859	10.507	11.200	11.926	12.994	13.669	14.622
2017	9.069	9.568	9.934	10.598	11.359	12.197	13.299	13.993	15.077
2018	9.003	9.556	9.950	10.634	11.449	12.393	13.504	14.234	15.410
2019	8.902	9.501	9.909	10.628	11.492	12.516	13.653	14.390	15.648
2020	8.766	9.416	9.826	10.580	11.500	12.585	13.734	14.475	15.795
2021	8.612	9.297	9.724	10.502	11.473	12.604	13.771	14.515	15.883
2022	8.443	9.159	9.601	10.410	11.419	12.592	13.763	14.518	15.943
2023	8.271	9.007	9.466	10.304	11.346	12.553	13.735	14.485	15.950
2024	8.094	8.859	9.324	10.186	11.262	12.489	13.688	14.434	15.919
2025	7.919	8.702	9.180	10.064	11.168	12.407	13.616	14.374	15.871
2026	7.736	8.549	9.027	9.932	11.063	12.315	13.536	14.290	15.789
2027	7.556	8.392	8.885	9.803	10.954	12.214	13.440	14.196	15.688
2028	7.378	8.245	8.740	9.674	10.838	12.104	13.340	14.104	15.588
2029	7.214	8.093	8.599	9.548	10.724	11.997	13.236	14.010	15.500
2030	7.042	7.950	8.468	9.424	10.609	11.896	13.126	13.904	15.421
2031	6.902	7.823	8.345	9.300	10.497	11.793	13.033	13.813	15.329
2032	6.759	7.687	8.230	9.190	10.385	11.686	12.931	13.709	15.239
2033	6.627	7.564	8.111	9.085	10.286	11.583	12.832	13.617	15.142
2034	6.512	7.448	7.997	8.986	10.187	11.483	12.745	13.522	15.054
2035	6.414	7.350	7.898	8.890	10.097	11.398	12.656	13.448	14.964
2036	6.306	7.259	7.804	8.802	10.014	11.314	12.570	13.367	14.888
2037	6.216	7.175	7.721	8.720	9.935	11.241	12.495	13.293	14.813
2038	6.150	7.086	7.646	8.649	9.859	11.165	12.416	13.214	14.704
2039	6.070	7.016	7.576	8.581	9.788	11.096	12.352	13.143	14.637
2040	6.010	6.958	7.509	8.521	9.726	11.033	12.291	13.077	14.581
2041	5.943	6.894	7.449	8.464	9.665	10.972	12.242	13.026	14.512
2042	5.899	6.845	7.392	8.405	9.612	10.924	12.189	12.966	14.458
2043	5.842	6.791	7.342	8.359	9.558	10.876	12.142	12.914	14.399
2044	5.802	6.740	7.303	8.310	9.514	10.828	12.095	12.865	14.374
2045	5.763	6.687	7.262	8.266	9.470	10.784	12.059	12.818	14.325
2046	5.710	6.651	7.216	8.225	9.427	10.743	12.015	12.780	14.310
2047	5.669	6.618	7.182	8.187	9.399	10.707	11.971	12.740	14.282
2048	5.638	6.586	7.154	8.155	9.364	10.676	11.932	12.703	14.230
2049	5.620	6.559	7.122	8.120	9.331	10.650	11.899	12.666	14.198
2050	5.593	6.530	7.090	8.093	9.302	10.619	11.871	12.634	14.172
2051	5.564	6.513	7.061	8.065	9.275	10.593	11.847	12.608	14.152
2052	5.526	6.484	7.039	8.037	9.250	10.563	11.819	12.580	14.109
2053	5.501	6.471	7.022	8.014	9.228	10.543	11.793	12.566	14.096
2054	5.481	6.446	7.004	7.989	9.205	10.524	11.770	12.544	14.069
2055	5.436	6.426	6.986	7.972	9.188	10.501	11.749	12.520	14.040
2056	5.420	6.411	6.962	7.959	9.169	10.480	11.728	12.510	13.999
2057	5.395	6.388	6.942	7.946	9.160	10.464	11.710	12.501	13.957

RETROSPECTIVE ADJUSTMENT COEFFICIENTS WERE APPLIED
TO THE POPULATION NUMBERS AT AGE IN YEAR: 2008

AGE	COEFFICIENT
1	0.950
2	0.993
3	0.999
4	0.906
5	0.847
6	0.818
7	0.799
8	0.750
9	0.698
10	0.686
11	0.692
12	0.698
13	0.702
14	0.712
15	0.737
16	0.742
17	0.746
18	0.752
19	0.757
20	0.759
21	0.758
22	0.759
23	0.756
24	0.752
25	0.751
26	0.769

REALIZED F SERIES

YEAR	AVG F	STD
2008	0.007	0.000
2009	0.006	0.000
2010	0.029	0.000
2011	0.029	0.000
2012	0.029	0.000
2013	0.029	0.000
2014	0.029	0.000
2015	0.029	0.000
2016	0.029	0.000
2017	0.029	0.000
2018	0.029	0.000
2019	0.029	0.000
2020	0.029	0.000
2021	0.029	0.000
2022	0.029	0.000
2023	0.029	0.000
2024	0.029	0.000
2025	0.029	0.000
2026	0.029	0.000
2027	0.029	0.000
2028	0.029	0.000
2029	0.029	0.000
2030	0.029	0.000
2031	0.029	0.000
2032	0.029	0.000
2033	0.029	0.000
2034	0.029	0.000
2035	0.029	0.000
2036	0.029	0.000
2037	0.029	0.000
2038	0.029	0.000
2039	0.029	0.000
2040	0.029	0.000
2041	0.029	0.000
2042	0.029	0.000
2043	0.029	0.000
2044	0.029	0.000
2045	0.029	0.000
2046	0.029	0.000

2047	0.029	0.000
2048	0.029	0.000
2049	0.029	0.000
2050	0.029	0.000
2051	0.029	0.000
2052	0.029	0.000
2053	0.029	0.000
2054	0.029	0.000
2055	0.029	0.000
2056	0.029	0.000
2057	0.029	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2008	0.006	0.006	0.006	0.007	0.007	0.007	0.008	0.008	0.008
2009	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
2010	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2011	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2012	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2013	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2014	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2015	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2016	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2017	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2018	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2019	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2020	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2021	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2022	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2023	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2024	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2025	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2026	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2027	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2028	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2030	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2031	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2032	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2033	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2034	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2035	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2036	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2037	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2038	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2039	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2040	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2041	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2042	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2043	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2044	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2045	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2046	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2047	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2048	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2049	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2050	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2051	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2052	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2053	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2054	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2055	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2056	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2057	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029

Appendix V

Summary of Past, Present, or Reasonably Foreseeable Future Actions

APPENDIX V

The actions summarized in the table below are presented in chronological order, and codes indicate whether an action relates to the past (P), present (Pr), or reasonably foreseeable future (RFF). When any of these abbreviations occur together, it indicates that some past actions are still relevant to the present and/or future. A brief explanation of the rationale for concluding what effect each action has (or will have) had on each of the VECs is provided in the table and is not repeated here.

Table I-1. Impacts of Past, Present and Reasonably Foreseeable Future Actions on the five VECs. These actions do not include those which were considered to have little impact on the fishery or actions under consideration in this frameworkt.

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS						
P Prosecution of the groundfish fisheries by foreign fleets in the area that would become the U.S. EEZ (prior to implementation of the MSA)	Foreign fishing pressure peaked in the 1960s and slowly declined until passage of the MSA in 1974 and implementation of the Multispecies FMP	**Direct High Negative** Foreign fishing depleted many groundfish stocks	**Potentially Direct High Negative** Limited information on discarding, but fishing effort was very high and there were no gear requirements to reduce bycatch	**Potentially Direct High Negative** Limited information on protected resources encounters, but fishing effort was very high	**Potentially Direct High Negative** Limited information on habitat, but fishing effort was very high	**Potentially Indirect Negative** Revenue from fishing was split between foreign and domestic communities, rather than just domestic communities
P Original FMP implemented in 1977	Established management of cod, haddock and yellowtail via catch quotas, quota allocations by vessel class and catch limits	**Direct Positive** Provided slight effort reductions and regulatory tools available to rebuild and manage stocks	**Indirect Positive** Reduced directed fishing effort on cod, haddock and yellowtail which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P] Interim Plan (1982)	Implemented GB seasonal closed areas, minimum fish size requirements in GB and GOM and permit requirements	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability
[P] Multispecies Plan (1986)	Revised FMP to include pollock, redfish, winter flounder, American plaice, witch flounder, windowpane flounder and white hake. Allowed additional minimum fish size restrictions, extended GB spawning area closures and a SNE closure to protect yellowtail flounder	**Direct Positive** Reduced directed fishing effort and provided the opportunity to manage additional groundfish species	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P] Amendments 1-4 to the Multispecies FMP (1987-1991)	Implemented closure in SNE/MA to protect yellowtail, extended GB RMA, added minimum mesh size requirements to SNE, excluded scallop dredge vessels from SNE closure, incorporated silver hake, red hake and ocean pout into the FMP	**Direct Positive** Reduced directed fishing effort and provided the opportunity to manage additional groundfish species	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability
[P] Multispecies Emergency Action (1994)	Implemented 500-lb haddock trip limit, expanded CA II closure time and area, prohibited scallop dredge vessels from possessing haddock from Jan-Jun and prohibited pair-trawling for multispecies	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Indirect Positive** Increased probability of long term sustainability

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr Amendment 5 to the FMP (1994)	Made the above Emergency Action measures permanent, enacted a moratorium on new participants in the fishery, reduced DAS for most vessels by 50% over a 5-7 year period, implemented mandatory reporting and observer requirements, etc.	**Direct High Positive** Reduced directed fishing effort and capped the number of participants allowed to direct on the fishery	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability by limiting the number of participants in the directed fishery. However, there was a negative impact for fishermen and communities where participation was reduced
, Pr Emergency Action (1994)	Implemented additional closed areas, prohibited scallop vessels from fishing in the closed areas, disallowed any fishery using mesh smaller than minimum mesh requirements, prohibited retaining regulated species with small mesh, etc.	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities

Action	Description	Impacts on Regulated Groundfish Stocks	Impacts on Non-groundfish species	Impacts on Endangered and Other Protected Species	Impacts on Habitat – Including Non-fishing Effects	Impacts on Human Communities
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr Framework 9 (1985)	Made the above Emergency Action measures permanent	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities
P, Pr Amendment 7 to the Multispecies FMP (1996)	Accelerated Amendment 5 DAS reduction schedule, implemented seasonal GOM closures, implemented 1,000 lb haddock trip limit, expanded the 5% bycatch rule, etc.	**Direct High Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Reduced fishing effort, thus reduced interactions with protected species	**Indirect Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Increased probability of long term sustainability but effort reductions result in short term lost revenues for fishermen and communities

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr] Framework 20 (1997)	Implemented GOM cod daily trip limit of 1,000 lb, increased the haddock daily trip limit to 1,000 lb and added gillnet effort-reduction measures such as net limits	**Mixed** Reduced directed fishing effort but allowed for an increase in haddock landings	**Mixed** Gillnet restrictions and reduced effort on cod helped reduce discards/bycatch but this may have been offset by increased effort on haddock	**Indirect Positive** Although the haddock daily trip limit increased, gillnet restrictions provide an overall positive impact	**Mixed** Reduced cod daily trip limit would be offset by increase haddock daily landing limit	**Mixed** Reduced revenues from a smaller cod daily trip limit could be offset by the increased haddock daily landing limit but gillnet effort reductions also have negative eco/soc impacts
[P, Pr] Framework 24 (1998)	Implemented an adjustment to GOM cod daily trip limit by requiring vessels to remain in port and run their DAS clock for a cod overage and implemented the DAS carryover provisions	**Direct Low Positive** Implemented minor effort reductions	**Indirect Low Positive** Implemented minor effort reductions which resulted in minor discard/bycatch reductions	**Indirect Low Positive** Slightly reduced fishing effort, thus reduced interactions with protected species	**Indirect Low Positive** Reduced fishing effort, thus reduced gear interactions with habitat	**Mixed** Vessels must remain in port with their clock running for a cod overage which has a negative impact but vessels may carryover DAS from one fishing year into the next.
[P, Pr] Framework 25 (1998)	Implemented GOM inshore closure areas, the year-round WGOM closure, the CLCA and reduced the GOM cod daily trip limit to 700 lb	**Direct Low Positive** Implemented effort reductions via reduced cod trip limit and closure areas	**Indirect Low Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Closure areas and effort controls reduce gear interactions with habitat	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr Framework 26 (1999)	Expansion of April GOM inshore closure area and, additional seasonal inshore GOM and GB area closures	**Direct Low Positive** Implemented effort reductions via closure areas	**Indirect Low Positive** Reduced directed fishing effort which resulted in discard bycatch reductions	**Indirect Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Closure areas and effort controls reduce gear interactions with habitat	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts
P, Pr, RFF Amendment 11 (1998)	Designated EFH for all species in the multispecies FMP and required Federal agencies to consult with NMFS on actions that may adversely effect EFH	**Indirect Low Positive** A consultation with NFMS that leads to the protection of multispecies EFH is beneficial to multispecies stocks	**Indirect Low Positive** A consultation with NFMS that leads to the protection of multispecies EFH is beneficial to other stocks that share the same EFH as multispecies stocks	**Indirect Low Positive** Consultation with NFMS that leads to the protection of multispecies EFH is beneficial to protected resources that share a need for the same habitat that multispecies stocks require	**Direct High Positive** Consultation with NMFS on activities that may adversely effect habitat provides NMFS the opportunity to mitigate or even prevent EFH impacts	**Indirect Low Positive** For instances where NMFS consults on projects impacting multispecies EFH, the overall health of the stocks should improve which would lead to long term sustainability

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr Framework 27 (1999)	Established large GOM rolling closures, modified CLCA, decreased GOM daily trip limit to 200 lb with subsequent reduction to 30 lb, increased haddock trip limit to 2,000 lb and increased minimum mesh size	**Mixed** Reduced directed fishing effort while also allowing the haddock trip limit to increase	**Mixed** A reduction in directed effort helped minimize bycatch and discards but increased haddock trip limit was somewhat offsetting	**Mixed** Reduced directed effort helps minimize protected species encounters but this was somewhat offset by the increased haddock trip limit	**Indirect Positive** Reduced directed effort and closed areas help improve habitat, this may be slightly offset by the increased haddock trip limit	**Mixed** Short term negative from closed areas and the reduced cod trip limit which were not offset by the increased haddock trip limit. Long term positive because of increased probability of sustainable stocks
P Interim Rule (1999)	Revised GOM cod trip limit to 100 lb/day up to 500 lb max and revised the DAS running clock to allow a 1-day overage only	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Low Positive** Effort controls result in reduced interactions with protected species	**Indirect Low Positive** Effort controls result in reduced habitat interactions	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts
P, Pr, RFF Amendment 9 (1999)	Prohibited used of brush sweep trawl gear, added halibut to the FMP with a 1-fish per trip possession limit	**Direct Positive** Reduced directed fishing effort	**Indirect Positive** Reduced directed fishing effort which resulted in discard/bycatch reductions	**Indirect Low Positive** Effort controls result in reduced interactions with protected species	**Indirect High Positive** Effort controls result in reduced habitat interactions	**Mixed** Increased probability of long term sustainability but short term negative eco/soc impacts

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr Framework 31 (2000)	Increased GOM Daily limit to 400 lb/day up to 4,000/lb per trip, added Feb GOM inshore closure and extended 1999 Interim Rule running clock measure	**Mixed** Increased cod directed fishing effort while also reducing effort via closure area and cod running clock measure	**Mixed** Increased effort on cod could lead to greater discards/bycatch which would be somewhat offset by effort reductions via closure area and cod running clock measure	**Mixed** Increased cod effort could increase interactions but somewhat offset by effort reductions via closure area and cod running clock measure	**Indirect Low Positive** Minor positive impacts from inshore closure area	**Mixed** Short term positive from increased cod trip limit but long-term sustainability of the cod resource was effected
P, Pr Framework 33 (2000)	Added GB seasonal closure area, added conditional GOM closure areas and increase haddock trip limit to 3,000 lb	**Mixed** Increased haddock directed fishing effort while also reducing effort via closure areas	**Mixed** Increased effort on haddock could lead to greater discards/bycatch which would be somewhat offset by effort reductions via closure areas	**Mixed** Increased haddock effort could increase interactions but somewhat offset by effort reductions via closure areas	**Indirect Low Positive** Minor positive impacts from closure areas	**Mixed** Short term positive from increased haddock trip limit but negative impacts resulting from closure areas

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Interim Action (Settlement Agreement; 2002)	Restricted DAS use, modified DAS clock for trip vessels, added year-round closure of CLCA, expanded rolling closures, prohibited front-loading DAS clock, increased GOM trawl and gillnet mesh size, added new limitations on Day gillnets and further restricted charter/party vessels	**Direct High Positive** Implemented substantial directed fishing reductions	**Indirect High Positive** Implemented substantial directed fishing reductions which also reduced discards/bycatch	**Indirect Positive** Fishing reductions and expanded closure areas reduce protected species interactions	**Indirect High Positive** Fishing reductions and expanded closure areas reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but positive regarding the long term sustainability of the fishery

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Interim Action (Settlement Agreement Continued; 2002)	Continued above interim measures, further reduced DAS allocations, prohibited issuance of additional handgear permits, eliminated GOM Jan and Feb closures, increased SNE trawl and GB/SNE gillnet mesh sizes, further limited day and trip gillnets, added longline gear restrictions, added possession limit and restrictions on yellowtail catch and increased GOM cod daily trip limit to 500/4,000 lb max	**Direct High Positive** Implemented substantial directed fishing reductions	**Indirect High Positive** Implemented substantial directed fishing reductions which also reduced discards/bycatch	**Indirect Positive** Fishing reductions reduce protected species interactions	**Indirect Positive** Fishing reductions reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but improving the long term sustainability of the fishery was positive

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Amendment 13 (2004)	Adopted new rebuilding periods and a new rebuilding program that included periodic adjustments and default DAS reductions to reduce effort over time, allowed DAS to be leased or transferred, created sector allocation and special access programs to allow access to stocks that can support an increase in catch	**Direct High Positive** Implemented substantial directed fishing reductions	**Mixed** Implemented substantial directed fishing reductions which also reduced discards/bycatch. However, the mores stringent restrictions created pressure to direct on other stocks (e.g., monkfish)	**Indirect Positive** Fishing reductions reduce protected species interactions	**Indirect Positive** Fishing reductions reduce negative impacts to habitat	**Mixed** Short term impacts due to restrictions were highly negative but improving the long term sustainability of the fishery was positive
P, Pr, RFF Framework 40A (2004)	Created additional SAPs to target healthy stocks	**Direct Positive** Directing effort toward healthy stocks relieved pressure on stocks of concern	**Indirect Negative** Increased bycatch of monkfish and skates	**Negligible** Although effort increased slightly, no effort shifts impacting protected species are known to have occurred	**Negligible** Although effort increased slightly, no effort shifts impacting habitat are known to have occurred	**Indirect Positive** Provided vessels the opportunity for greater revenue while relieving pressure on stocks of concern

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 40B (2005)	Relaxed DAS leasing and transfer requirements, created new yellowtail flounder SAP, provided greater opportunity for vessels to participate in the GB Cod Hook Sector, removed the net trip limit for gillnets, etc.	**Negligible** Mix of alternatives, some of which slightly increased effort and others that slightly decreased effort. Overall, changes did not threaten rebuilding targets established by Amendment 13	**Indirect Low Negative** Mix of alternatives that primarily had little impact on discards/bycatch with the exception of removing the net trip limit for gillnets which increased monkfish effort	**Negligible** Slight effort changes did not have measurable impacts to protected species	**Negligible** Slight effort changes did not have measurable impacts to habitat	**Indirect Low Positive** Slight changes to the leasing and transfer programs along with greater opportunities to participate in SAPs provides an opportunity for greater revenue
P, Pr, RFF Framework 41 (2005)	Allowed for participation in the Hook Gear Haddock SAP by non-Sector vessels	**Direct Low Positive** Encouraged effort on haddock, a healthy stock, and thus away from other stocks of concern	**Indirect Low Negative** Although directed effort shifted to a healthier stock, there was an overall effort increase resulting in a greater opportunity for bycatch/discards	**Negligible** Slight effort changes did not have measurable impacts to protected species	**Negligible** Slight effort changes did not have measurable impacts to habitat	**Indirect Low Positive** Greater opportunity to fish for a healthy stock provides increased revenue

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P Emergency Action (2006)	Implemented differential A DAS of 1.4:1, restricted the B Regular DAS program and US/CA Haddock SAP and reduced trip limits on cod, yellowtail, etc.	**Direct High Positive** Implemented effort reductions that anticipated achieving mortality reductions needed to keep stocks on track to rebuild	**Mixed** Effort reductions lead to reduced discards/bycatch but the B Regular DAS program increased monkfish and skate bycatch	**Negligible** Effort changes did not have measurable impacts to protected species	**Negligible** Effort changes did not have more than minimal impacts to habitat	**Mix** Short term effort reductions have a negative impact on revenues but increase long term sustainability of stocks
MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 42 (2006)	Reduced the number of A DAS available, modified differential DAS counting to 2:1 in the GOM and SNE, reduced trip limits for several stocks, increased recreations minimum fish sizes, required use of VMS by all vessels, modified the SAPs, limited the bycatch of monkfish and skates for vessels using a haddock separator trawl, etc.	**Direct High Positive** Implemented effort reductions that anticipated achieving mortality reductions needed to keep stocks on track to rebuild	**Indirect Positive** Effort reductions lead to reduced discards/bycatch and measures were implemented to control monkfish and skate bycatch	**Indirect Low Positive** Overall effort reductions have a positive impact, particularly to protected species in high use areas such as the GOM and SNE where strict differential counting rules are in effect	**Indirect Low Positive** Overall effort reductions have a positive impact	**Mixed** Effort reductions have a significant negative impact to vessel owners and communities, primarily due to loss of revenues. Over the long term however, stocks should remain sustainable

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFF Framework 43 (2006)	Established a haddock incidental bycatch limit in the herring fishery on GB	**Mixed** While the incidental haddock allowance allows some legal catch of haddock which has a negative impact, the area is closed after the bycatch cap is reached which prohibits further harvest (positive impact)	**Negligible** The herring fishery is fairly clean and the increased haddock bycatch problem arose from strong 2003 and 2004 year classes. Allowing legal retention of haddock bycatch should not alter fishing practices in a manner that would impact species taken as bycatch	**Negligible** Although attaining the bycatch cap could reduce effort on GB, the extent of this reduction was not expected to have an overall impact on protected species	**Negligible** Gear used to target herring have been found not to have an impact on habitat	**Mixed** Allowing herring vessels to continue fishing practices on GB has a positive impact on those vessels and communities. However, the loss of the potential haddock catch has a negative impact on fishermen targeting groundfish
RFF Amendment 16 (2010)	Modifies rebuilding mortality targets and status determination criteria, adopts ACL/AM requirements, modifies effort controls, expands sector policies, implements 17 additional sectors, modifies SAPs, changes DAS leasing and transfer programs	**Direct High Positive** Suite of measures reduces fishing mortality on groundfish stocks to continue rebuilding	**Indirect Positive** Reduced effort from common-pool and sector measures expected to reduce discards of non-target species	**Indirect Low Postive** If common pool and sector measures reduce overall groundfishfishing effort, this will likely reduce protected species impacts	**Direct Low Positive** Fishing effort reductions from common pool and sector measurres should reduce interactions with EFH	**Mixed** Combination of effort controls and sector measures likely to reduce number of vessels, crew, communities participating in fishery, but remaining participants may be more profitable

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
RFF Framework 45 (2011)	Modify GB yellowtail flounder rebuilding strategy	**Direct Low Negative** Expected to extend rebuilding period for GB yellowtail flounder beyond 2014 and allow increased fishing mortality	**Negligible** Analysis not complete, but increased opportunities to catch GB YTF unlikely to substantially change fishing mortality on other species	**Negligible** Analysis not complete, but increased opportunities to catch GB YTF unlikely to increase interactions with protected species	**Negligible** Analysis not complete, but increased opportunities to catch GB YTF unlikely to substantially affect impacts on EFH	**Minor Positive** Analysis not complete, but increased opportunities to catch GB YTF may provide minor benefits to fishing communities
RFF Amendment 17 (2011)	Allow for transfer of yellowtail flounder between the scallop and groundfish fisheries	**Negligible** Provision does not result in increased catches, should not affect overallfishing mortality	**Negligible** Analysis not complete; may allow for increased scallop harvest but does not change targeted amount. May result in marginally lower groundfish fishing effort if YTF is traded to the scallop fleet.	**Negligible** Analysis not complete; may allow for increased scallop harvest which could increase interactions with protected species by that fleet; but at the same time may reduce interactions by groundfish fleet.	**Unknown** Analysis not complete; may allow for increased scallop harvest, possibly increasing interactions of dredge fishery with EFH. May result in marginally lower groundfish fishing effort if YTF is traded to the scallop fleet.	**Minor Positive** Bothgroundfish and scallop fishign commnties may benefit from rational exchange of GB YTF which may maximize fishing revenues and opportunities.

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MULTISPECIES FISHERY-RELATED ACTIONS CONTINUED						
RFF Sector EAs (2010)	Sector EAs would be prepared for each sector approved under this Amendment. These documents would assess impacts from exemptions granted to individual sectors that go beyond the universal exemptions	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Negligible** Because exemptions granted to sectors must strive to have neutral impacts compared to common pool vessels, impacts would be negligible	**Low Positive** Because one of the intents of sectors is to provide participants greater freedom to maximize their operations, revenues would be expected to be slightly higher
OTHER FISHERY-RELATED ACTIONS						
P, Pr, RFF Atlantic Sea Scallop FMP – a series of amendment and framework actions from the mid-1990s through the present	Implementation of the Atlantic Sea Scallop FMP and continued management of the fishery, primarily through effort controls	**Direct Positive** Effort reductions taken over time have resulted in a sustainable scallop fishery	**Indirect Positive** Effort reductions taken over time also reduced bycatch, including gear modifications that improved bycatch escapement	**Mixed** Effort reductions taken over time reduced interactions with protected species however, turtle interactions remain problematic	**Indirect Positive** Effort reductions reduced gear contact with habitat and the current rotational access program focuses fishing effort on sandy substrates which are less susceptible to habitat impacts	**Indirect Positive** Initial negative impacts due to effort reductions have been supplanted by a sustainable, profitable fishery

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OTHER FISHERY-RELATED ACTIONS CONTINUED						
[P, Pr, RFF] Monkfish FMP – a series of amendment and framework actions from implementation of the FMP in 1999 through the present	Implementation of the monkfish FMP and continued management of the fishery, primarily through effort controls	**Direct Positive** Effort reductions have resulted in a fishery that is no longer overfished, nor is overfishing occurring	**Indirect Positive** Effort reductions taken over time also reduced bycatch	**Indirect Positive** Reducing effort reduced opportunities for interactions with protected species	**Indirect Positive** Reducing effort reduced opportunities for habitat interactions	**Indirect Positive** Reducing effort has created a sustainable fishery
[Pr, RFF] Large Whale Take Reduction Plan Amendment (2008)	Removed the DAM program, will implement sinking ground lines for lobster gear, includes more trap/pot and gillnet fisheries under the protection plan and requires additional markings on gear to improve information regarding where and how entanglements occur	**Negligible** Changes implemented through the amendment are not expected to have substantial changes on groundfish	**Negligible** Changes implemented through the amendment are not expected to have substantial changes on non-groundfish species	**Direct Positive** New regulations implemented to protect large whales are expected to have a positive impact on large whales by reducing incidental takes	**Negligible** Changes implemented through the amendment are not expected to have substantial changes to habitat	**Indirect Negative** Changes implemented through the amendment require some gear changes for gillnet fisheries which have minor negative economic impacts

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OTHER FISHERY-RELATED ACTIONS CONTINUED						
RFF Harbor Porpoise Take Reduction Plan Amendment (~2010)	Options are currently under development to reduce takes of harbor porpoise toward the long-term zero mortality rate goal	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact groundfish	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact non-groundfish species	**Direct Positive** Changes to protect harbor porpoise have a positive impact on protected species	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact habitat	**Unknown** If current measures such as closure areas and the use of pingers are expanded upon or modified, it could impact human communities
RFF Essential Fish Habitat Omnibus Amendment (~2010/2011)	This amendment would revised EFH designations for all New England fisheries, possibly establish new HAPCs and consider measures to further protect critical habitat	**Unknown** If new measures are implemented to protect habitat, they would likely have a positive impact on groundfish	**Unknown** If new measures are implemented to protect habitat, they could have a positive impact non-groundfish species	**Unknown** If new measures are implemented to protect habitat, they could potentially impact protected species	**Direct Positive** New measures implemented to protect habitat would have a positive impact on habitat	**Unknown** If new measures are implemented to protect habitat, they would likely impact human communities
RFF Amendment 3 to the Skate FMP (2010)	This amendment addresses rebuilding of winter and thorny skates and reduce mortality on little and smooth skates; reduces trip limits, adopts ACLs and AMs	**Minor Negative** Lower skate possession limits and closures may cause vessels to use DAS for groundfish	**Mixed** Actions taken to reduce skate mortality; they could leadto increased targeting of non-groundfish species	**Unknown** If actions are taken to reduce skate mortality, they could impact protected species	**Unknown** If actions are taken to reduce skate mortality, they could impact habitat	**Minor negative** Actions taken to reduce skate mortality negatively impact human communities

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NON FISHERY-RELATED ACTIONS						
P, Pr, RFFA Agriculture runoff	Nutrients applied to agriculture land are introduced into aquatic systems	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability and can lead to reduced income from fishery resources
P, Pr, RFFA Port maintenance	Dredging of wetlands, coastal, port and harbor areas for port maintenance	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area
P, Pr, RFFA Offshore disposal of dredged materials	Disposal of dredged materials	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area

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NON FISHERY-RELATED ACTIONS CONTINUED						
P, Pr, RFFA Beach nourishment	Offshore mining of sand for beaches	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for mining companies, possibly negative for fisheries
	Placement of sand to nourish beach shorelines	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Positive** Improves beaches and can help protect homes along the shore line
P, Pr, RFFA Marine transportation	Expansion of port facilities, vessel operations and recreational marinas	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for some interests, potential displacement for others
P, Pr, RFFA Installation of pipelines, utility lines and cables	Transportation of oil, gas and energy through pipelines, utility lines and cables	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Initially reduced habitat quality in the immediate project area	**Mixed** End users benefit from improved pipelines, cables, etc., but reduced habitat quality may impact fisheries and revenues

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NON FISHERY-RELATED ACTIONS CONTINUED						
Pr, RFFA Liquefied Natural Gas (LNG) terminals (w/in 5 years)	Transportation of natural gas via tanker to terminals located offshore and onshore (Several LNG terminals are proposed, including ME, MA, NY, NJ and MD)	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Mixed** End users benefit from a steady supply of natural gas but reduced habitat quality may impact fisheries and revenues
RFFA Offshore Wind Energy Facilities (w/in 5 years)	Construction of wind turbines to harness electrical power (Several facilities proposed from ME through NC, including off the coast of MA)	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Indirect Negative** Initially localized decreases in habitat quality in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Mixed** End users benefit from a clean energy production but reduced habitat quality may impact fisheries and revenues